

## ARCHIVES OF OTOTOLOGY.

### THE LIMITS OF VARIATION IN THE DEPTH OF THE MASTOID ANTRUM.<sup>1</sup>

By PHILIP D. KERRISON, M.D.

(*With ten illustrations on Text-plates II.-V.*)

WHILE all observers agree that the antrum may be reached at a depth of 8 to 10 mm, there is a surprising diversity of opinion as to the maximum depth, or the depth beyond which it is not safe to proceed in an attempt to expose the antrum. The following authors are cited as to its maximum depth: Gruber, 15 mm (a little less than  $\frac{5}{8}$  inch); Politzer, 15 mm; Buck,  $\frac{3}{4}$  inch; Dench,  $\frac{7}{8}$  inch; Schwartze, 25 mm (about 1 inch); Broca, 29 mm, or about  $1\frac{1}{2}$  inches.

Between the two extremes here expressed the contradiction is even greater than at first appears; for whereas Gruber and Politzer give 15 mm as the depth beyond which it is not safe to go, Broca contends that if the antrum is not reached at a depth of 25 mm, the surgeon should not be afraid to go still farther. Obviously one or the other view must be incorrect.

To bring order out of this confusing diversity of opinion, some fixed point upon the mastoid cortex should be agreed upon, from which to measure the depth of the antrum. This, in the writer's opinion, should be the one point which is always nearest the antrum—viz., the space just behind the spine of Henle, and inclosed in the well-known triangle formed by the postero-superior arc of the meatus and the

<sup>1</sup> Read before the Section on Otology of the N. Y. Academy of Medicine, March 12, 1903.

lines running tangent to the superior and posterior walls of the meatus respectively. This space we shall call for convenience the triangle of election.

As the antrum always lies immediately behind the tympanic vault, and as the postero-superior wall of the meatus always measures the distance between the vault and the cortical surface just behind the spine of Henle, it occurred to the writer that some relation might be found to exist between the length of the postero-superior wall of the meatus and the depth of the antrum.

To determine this, careful measurements were taken of thirty bones, taken at random as they could be obtained. In measuring the postero-superior wall of the meatus, the distance in millimetres was taken between Henle's spine externally and the inner margin of the meatus internally. Sections were then made, bisecting the mastoid cortex in a vertical line passing through the posterior boundary of the triangle of election, and cleaving the bone from before backward in a plane diverging from that of the posterior wall of the meatus by an angle of 30 to 35 degrees. These sections in every case exposed the antrum, and made it an easy matter to measure the thickness of the bone separating it from the mastoid cortex.

The measurements thus obtained seemed clearly to prove three facts: viz., 1st, that in different temporal bones much greater variations exist as to the length of the bony meatus than are noted in most text-books; 2d, that the depth of the antrum is always less by actual measurement than the postero-superior canal wall; and 3d, that the depth of the antrum rarely, if ever, exceeds 15 mm, or about  $\frac{5}{8}$  inch. (See Text-plate No. II., Figs. 1 and 2.)

In the thirty bones presented for examination, the length of the postero-superior canal wall varies from 12 mm to 18 mm as follows:—in three it is 12 mm; in three, 13 mm; in eight it is 14 mm; in five, 15 mm; in eight 16 mm; in two 17 mm., and in one it is 18 mm.

In the same bones the depth of the antrum varies from 6 to 15 mm. These varying depths may be stated in their relation to the canal wall as follows:

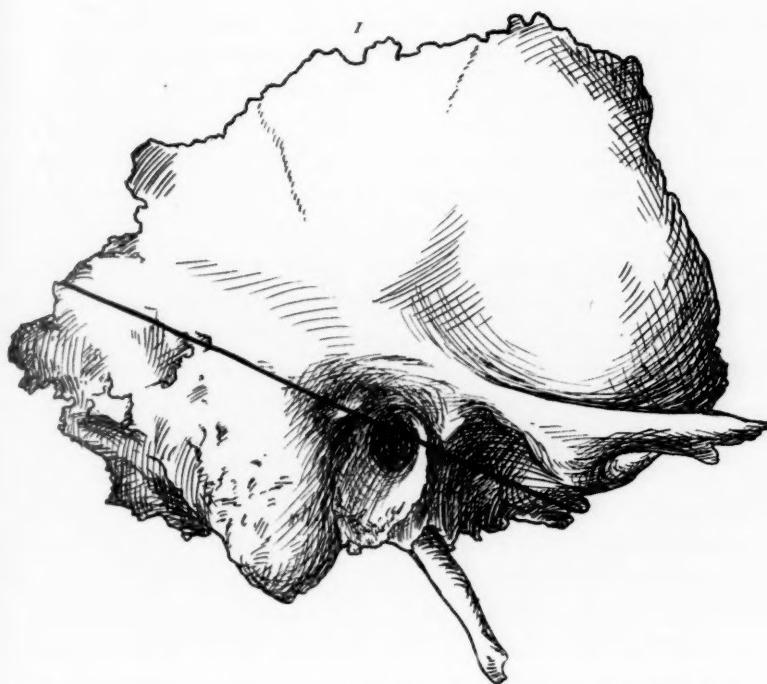
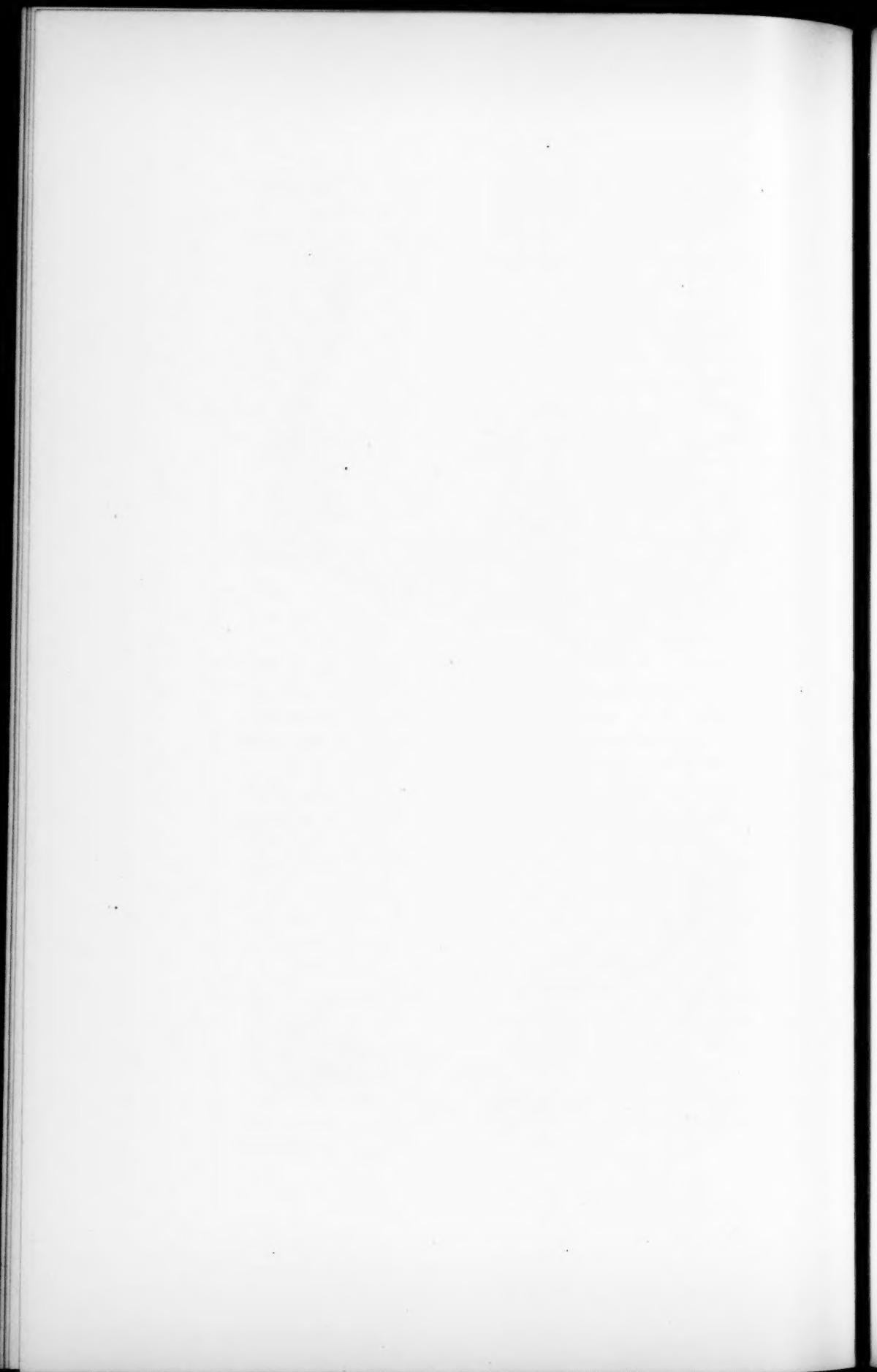


Fig. 1. Temporal bone—showing line of section passing through antrum and bony meatus.



Fig. 2. Top view of lower segment of above—showing length of postero-superior canal wall and depth of antrum (dotted line).



*Postero-superior canal wall*, 12 mm in depth, 3 bones; depth of antrum 7 mm, 9 mm, and 10 mm, respectively.

*Canal wall*, 13 mm long, 3 bones; depth of antrum 6 mm in one, and 10 mm each in the other two.

*Canal wall*, 14 mm long, 8 bones; depth of antrum 10 mm in two, 11 mm in four, and 12 mm each in the other two.

*Canal wall*, 15 mm long, 5 bones; depth of antrum 12 mm in three, and 8 mm and 11 mm in the other two respectively.

*Canal wall*, 16 mm long, 8 bones; depth of antrum 12 mm in two, 14 mm in two, and 9 mm, 10 mm, 11 mm, and 13 mm in the other four respectively.

*Canal wall*, 17 mm long, 2 bones; depth of antrum 11 mm and 12 mm, respectively.

*Canal wall*, 18 mm long, one bone with depth of antrum 15 mm.

An analysis of the above reveals a certain general relation between the length of the meatus and the depth of the antrum. Thus the average length of the postero-superior canal wall is 14.7 mm, and the average depth of the antrum is about 11 mm. The average difference between the length of the canal wall is 3.7 mm, the greatest difference is 7 mm, and the smallest is 2 mm. The deepest antrum in this series is 15 mm, and this extreme depth occurs in the one bone in which the canal wall measures 18 mm, the extreme length. But the point calling for special emphasis is the fact that the depth of the antrum, whether its cavity be large or small, is invariably less than the length of the postero-superior wall of the meatus, and never exceeds 15 mm.

Accepting the above conclusions as correct, it is difficult to explain the extreme views recorded by certain writers as to the depth of the antrum. Broca, for instance, gives 29 mm as the maximum depth of the antrum. For the preliminary opening in the mastoid cortex, he directs that a space one centimetre square be marked off, the upper border of this square to be on a level with, and the anterior border to be 5 mm behind, Henle's spine. The centre of this square is a full centimetre behind the spine, and marks in most bones the thickest part of the mastoid process. It

is not surprising, therefore, that Broca finds the antrum in some cases of unusual depth, for he enters the bone at a point from which it is necessary to work his way obliquely inward and forward, instead of directly inward as from the triangle of election. (See Text-plate No. III., Figs. 3, 4, and 5.)

If it were necessary to urge a further objection to approaching the antrum from this point, it might be found in the greater danger of exposing the lateral sinus. In alluding to reported cases in which the sinus groove was situated so far forward as to render it difficult to avoid injury to the sinus, Broca implies that in all his experience he has not met with such a phenomenon. Of a series of fifty bones examined by the writer, in two the sinus groove was so placed that it would be impossible in operating by his method to avoid injuring the vessel.

Politzer opens the cortex at a point 7 mm behind the supra-meatal spine, and yet gives 15 mm as the maximum depth of the antrum. It is worthy of note that he bases this estimate on a large series of bone sections.

Some of the extreme views as to the depth of the antrum may have been based upon observations made during operations upon the living subject. Such observations can have but little value, for the reason that it is impossible during the course of a surgical operation to make careful and exact measurements, and also from the fact that one is apt to receive impressions from the depth to which the probe is passed into the exposed antrum—*i. e.*, the depth of its inner wall. Naturally one might in this way receive an exaggerated impression as to the depth at which its cavity is entered.

This paper is a plea for greater exactness in the expression of anatomical facts having surgical importance. If we would measure the depth of the antrum from the triangular space behind Henle's spine, this fact should be stated, and from this point the antrum is never 1 inch,  $\frac{7}{8}$  inch or  $\frac{3}{4}$  inch in depth.

We must bear in mind that in the great majority of bones the level of the facial canal and horizontal semicircular canal is reached at a depth of 15 to 18 mm beneath the cortex.

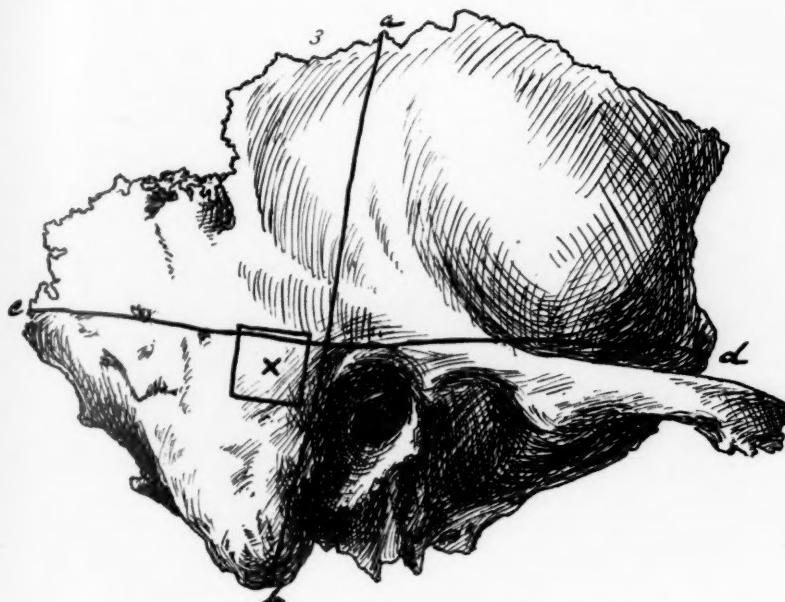


Fig. 3. Temporal bone — showing line of vertical section (*ab*), line of horizontal section (*cd*), Broca's square (x), and triangle of election.



Fig. 4. Top view of lower segment Fig. 1, through section *cd*—showing depth of antrum from triangle of election (black line), and from Broca's square (dotted line).



Fig. 5. Anterior view of posterior segment, section *ab* — showing depth of antrum from triangle of election (black line), and from Broca's square (dotted line).

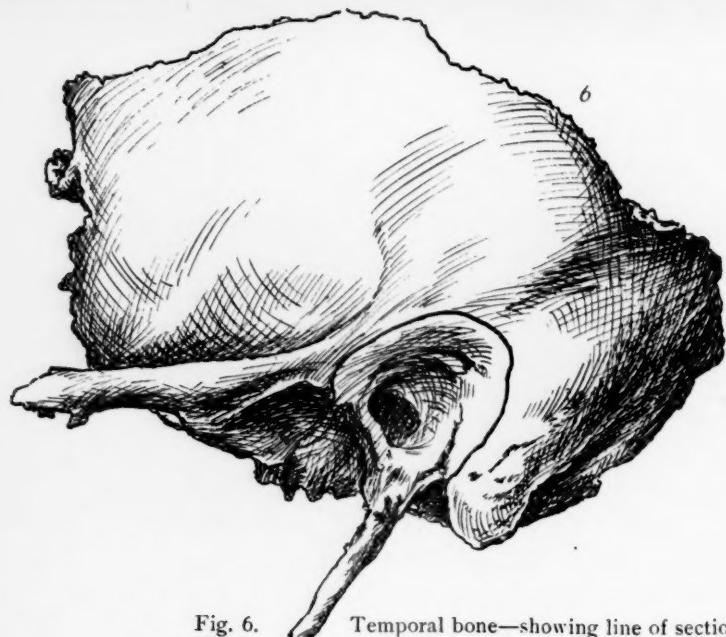


Fig. 6. Temporal bone—showing line of section.



Fig. 7. Same bone with section removed. Facial canal, with cord representing nerve, exposed in three places. Showing relation of horizontal semicircular canal and bend of facial canal to antrum.



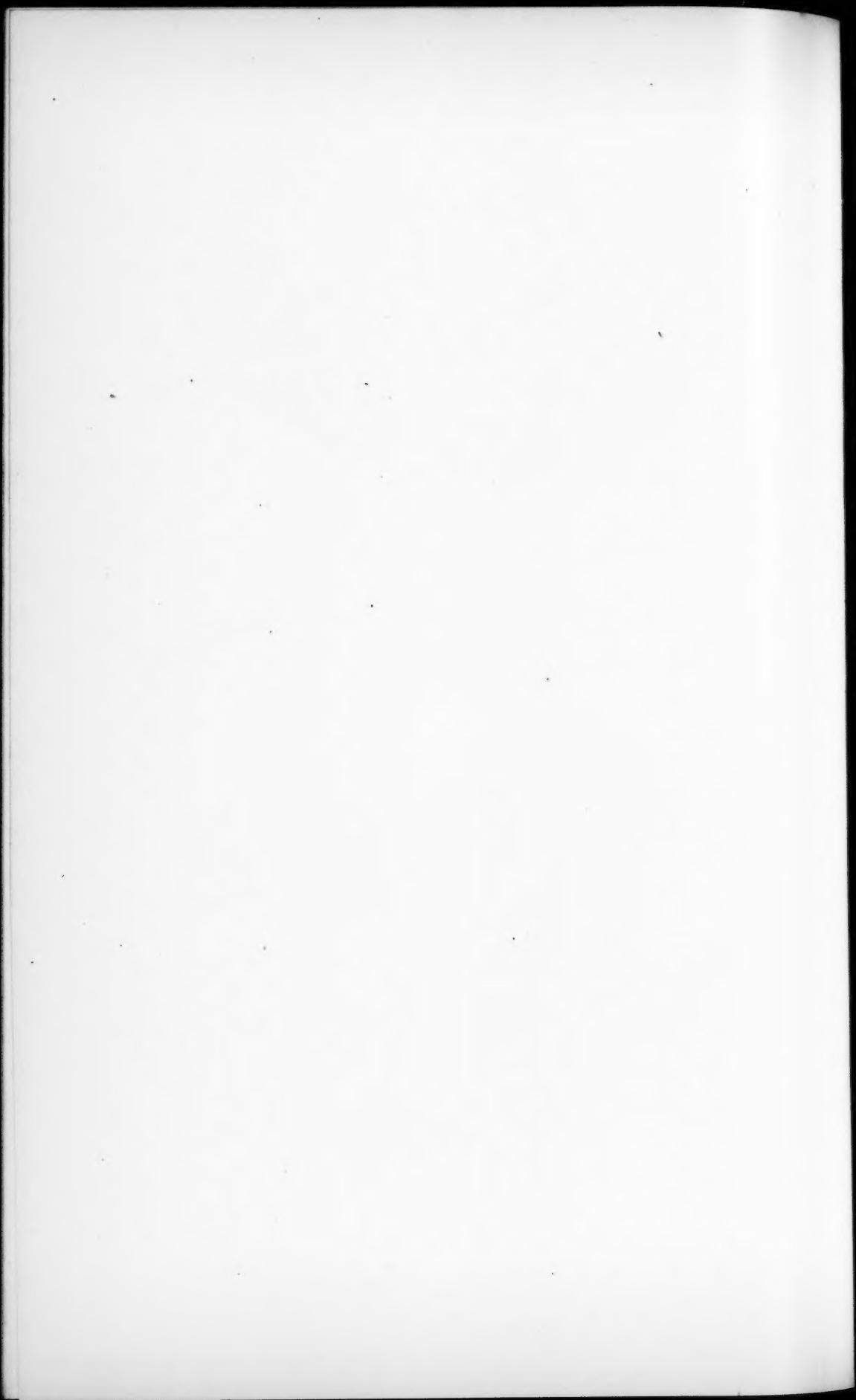
Fig. 8. Portion of bone removed.



Fig. 9. Temporal bone—showing line of section.



Fig. 10. Side view of Fig. 9, anterior segment. Cord representing facial nerve. Horizontal semicircular canal and bend of facial canal exposed—showing their relation to antrum.



These structures are not confined to the circumscribed space covered by the inner tympanic wall, but extend well backward into the aditus, the semicircular canal lying behind, and the facial canal just below, that bony space. The tympanic portion of the aqueduct, presenting as a horizontal ridge just above the oval window, is certainly not the only region in which the nerve may be exposed to injury. The relation of the bend of the canal to the aditus and antrum is more intimate and surgically important than is generally recognized. This relation is very well shown in several of the writer's specimens presented to-night. (See Text-plates No. IV. and No. V.) When, therefore, we recall the statement of Broca, that if in the course of a mastoid operation the antrum is not reached at a depth of 20, 22, or 25 mm, the surgeon need not be afraid to go still farther, the importance of correcting so dangerous a dogma becomes obvious.

What we have spoken of as the triangle of election has been described by many writers as the surgical guide to the antrum.

So far as we are justified in drawing any conclusions from the measurements presented and facts adduced, they may be stated as follows:

1. That in operations upon the mastoid process the antrum should always be approached from the nearest point upon the mastoid cortex, which in the great majority of bones is the small triangular space just behind the spine of Henle.
2. That this point of attack not only furnishes a guide to the site of the antrum, but also gives fairly accurate data as to the depth beyond which it is not safe to proceed.
3. That the depth of the antrum is always less than the length of the postero-superior wall of the meatus; that in the great majority of bones it is not over 12 mm, is often very much less, and is never greater than 15 mm, or  $\frac{5}{8}$  inch; and therefore —
4. That in a surgical attempt to expose the antrum a depth of  $\frac{5}{8}$  inch should be regarded as the extreme limit of safety.

N. B.—The original drawings for this paper were prepared

from the writer's specimens by Dr. H. J. Prentiss, of the University—Bellevue Medical College,—to whom the writer wishes particularly to express his thanks.

#### REFERENCES.

1. GRUBER'S *Diseases of Ear*, p. 437.
2. POLITZER'S *Diseases of Ear*, 3d edition, p. 513.
3. BUCK, *Diseases of Ear*, p. 436.
4. DENCH, *Diseases of Ear*, p. 438.
5. SCHWARTZE, quoted by Gruber. *Loc. cit.*, p. 438.
6. BROCA, *Surgical Anatomy of Ear*, p. 9.

INTRADURAL AND LATER DOUBLE CEREBRAL  
ABSCCESS COMPLICATING CHRONIC TYM-  
PANIC SUPPURATION; OPERATIONS; CURE.

By B. ALEX. RANDALL, M.A., M.D., AND BARTON H.  
POTTS, M.D., PHILADELPHIA.

(With a Temperature Chart.)

F. K., aged four years, came to Dr. Potts in the dispensary of the Children's Hospital with a history of discharge from the left ear for two years. Two weeks before being seen, the discharge ceased and the child complained of pain about the left ear. One week before examination, a slight swelling appeared behind the ear and she complained of headache, most marked in the region of the temple. She had not retained food for two days and vomited under examination.

Examination showed some œdema behind the auricle, but no fluctuation; some tenderness over the mastoid; upper and posterior canal-wall red and sagging; temperature  $102^{\circ}$  Fahr. Hospital care was advised, with probable operation.

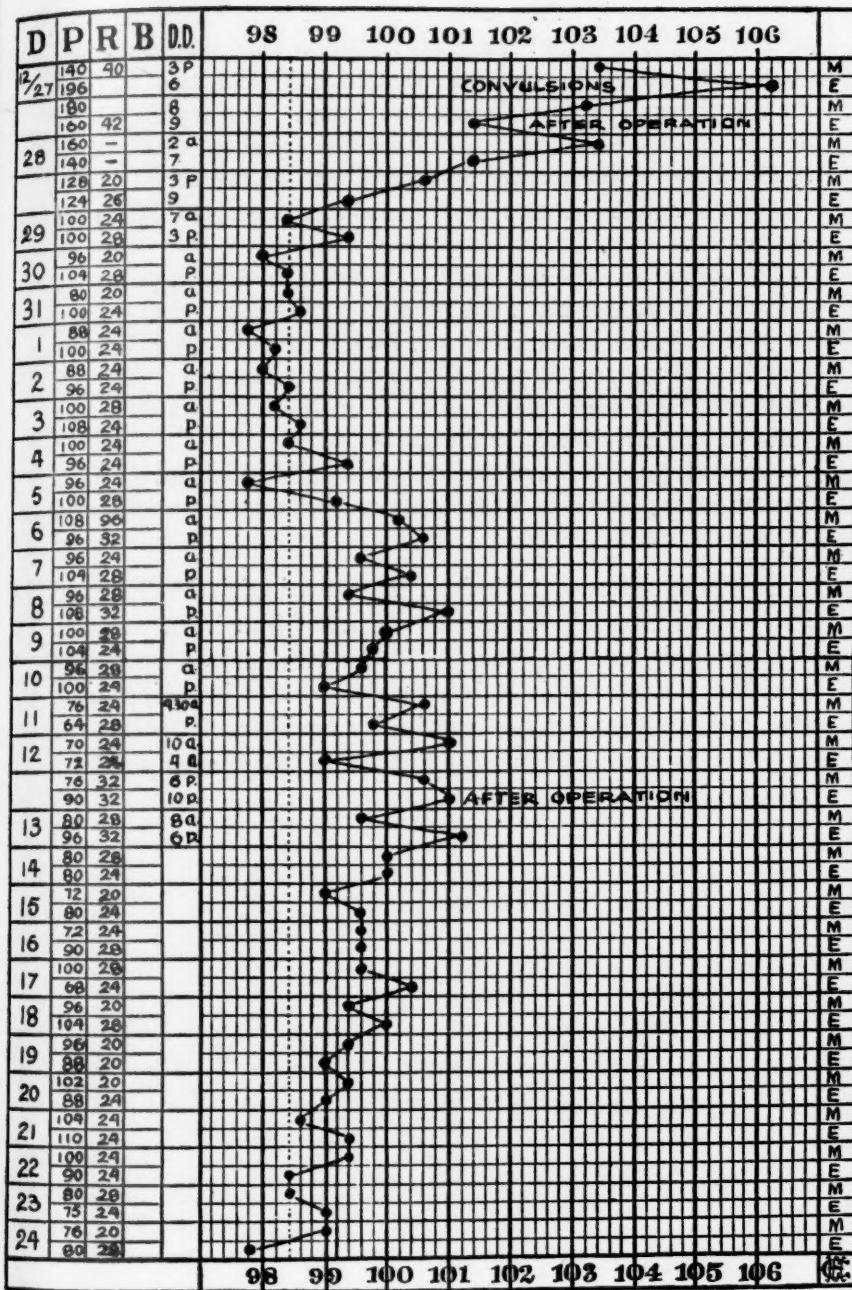
The patient was admitted to the house where she was soon examined by Dr. Randall, who arranged to operate at the earliest convenient hour. The eye-grounds and ocular movements were normal. A few minutes later the patient went into a general and quite violent convulsion, more marked on the right side, the muscles of the right side of the face and right eye being involved. At this time and on the return of the convulsions later, chloroform was administered, which quieted the movements except those of the right arm and leg, but upon the withdrawal of the anaesthetic the convolution returned. The temperature rose to  $106.2^{\circ}$  Fahr. with pulse 180 and very thready. A lumbar puncture was done finding high pressure and drawing off between three and four ounces of clear fluid, which gave temporary relief.

Under ether, the usual incision for a mastoid operation was made by Dr. Potts, letting out a little pus from the sagging canal-tissues, and the intact mastoid was opened with a spoon. Some pus and granulations were found in and near the antrum and pus was seen flowing from up and back. With spoon and rongeur the course of the pus was followed until the middle cerebral fossa was freely opened and a perforation of the dura, 2 mm in width, was discovered, out of which the pus was pulsing. An incision 3.5 cm in length through the dura exposed the brain surface, which was carefully examined, but showed no sign of deeper trouble; so, after irrigation, the dural wound was sutured. A tympano-mastoid exenteration was then completed on account of the history of chronic suppurative otitis media.

The convulsive movements ceased during the operation and the patient's condition improved; the pulse being of fair quality, rate 160. A restless night was followed by paralysis of the right arm and leg. When dressed on the fifth day there was some protrusion of the cerebral substance, which showed pulsation. Temperature was normal and motion was returning to the right arm.

On the tenth day the temperature began to show some febrile reaction, and a study of the accompanying chart will show the interesting and significant discrepancy between the temperature and pulse-rate, the latter becoming more and more slow and out of proportion to the former. Its hourly noting was ordered. On the fifteenth day it fell to 64; but this through an error was not recorded on the bed-chart. The child seemed comfortable, took milk well, but vomited several times on the fourteenth day. On the sixteenth day vomiting began again and the urine was voided involuntarily; the child sank into a condition of semi-stupor; pupils equal and possibly slightly sluggish. No doubt could be entertained that brain-abscess demanded intervention.

As the cerebral surface was bare for a sufficient area it was deemed best to explore for brain-abscess without an anaesthetic. An Allis dry dissector was passed by Dr. Potts through the protruding and pulsating cerebral substance in a forward, inward, and slightly downward direction to the region of the tegmen. The blade was too quickly withdrawn after a little less than the full permissible penetration. It was then re-entered, passed a half inch farther, rotated partly in its track, and very slowly withdrawn. A trace of pus followed it. Forceps were then introduced and expanded and an abscess-cavity containing four or five ounces of



pus was evacuated. The cavity was treated by the usual method of douching with warm boracic-acid solution until the fluid came away clear and gently curetting the walls with pledgets of cotton; the wound was packed with iodoform gauze. During the operation the pulse rose to 88 and improved in quality; the patient regained color; she laughed and talked with no suggestion of discomfort, although about an hour was taken to complete the gentle evacuation.

The wound was dressed daily. On the third day the pulse had dropped again, and when the packing was removed there was a gush of fully six drachms of pus from a second cavity that was found to lie above and posterior to the original one. This was treated as the former one had been, but drainage by soft rubber catheter was substituted for the gauze.

From this time on convalescence was uninterrupted and the child is now, after ten weeks, running around with healed wound and apparently well.

Subdural abscess or limited leptomeningitis is rare, and its relation to cerebral abscess has not often been definite. It seems fair to claim that here the two lesions were consecutive and the brain-lesion caused by the infection from the surface, although no continuity could be traced. The tegmen, as studied from both sides at the first operation, seemed intact.

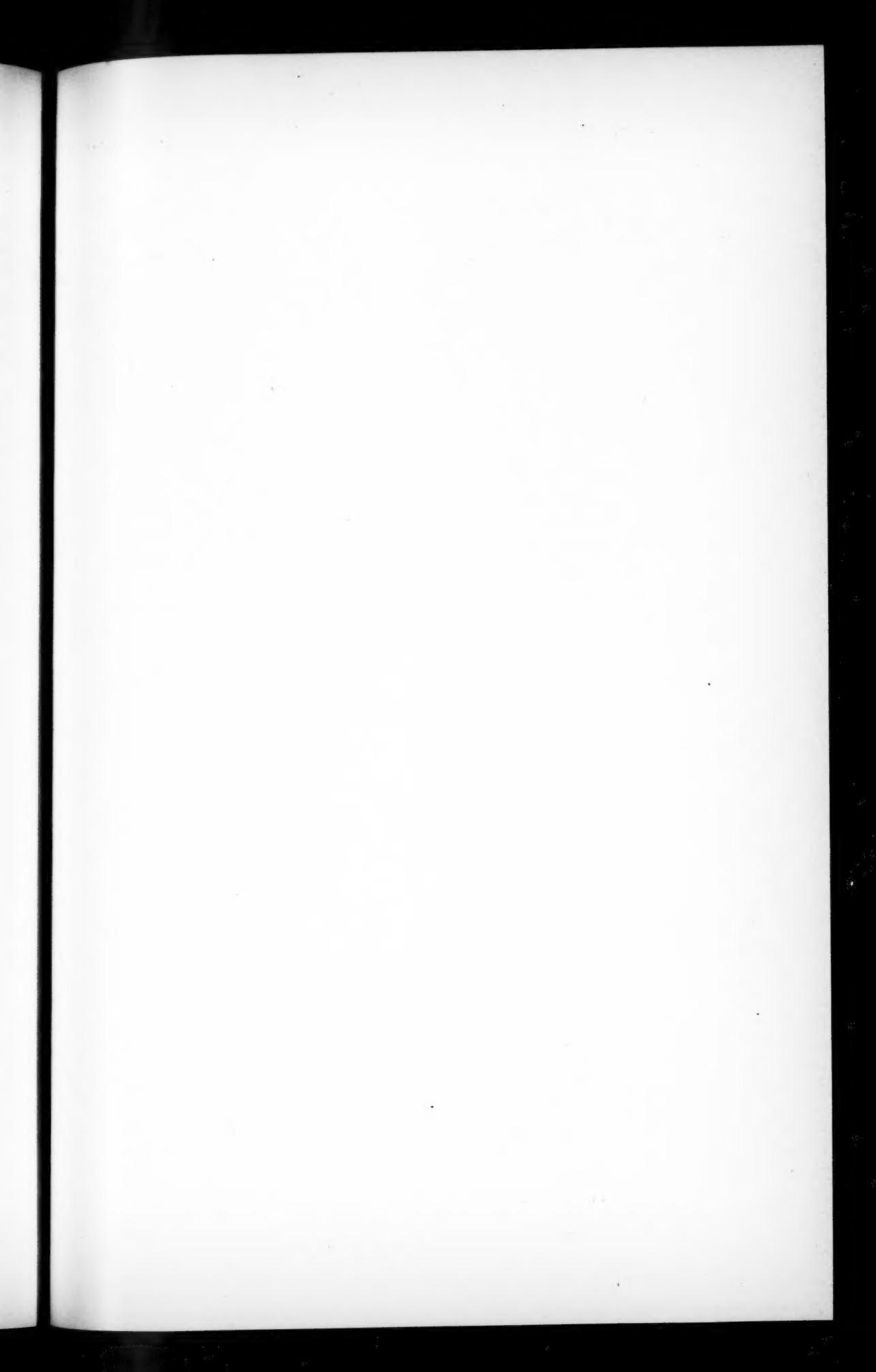




FIG. 1. Photograph of patient showing external dilatation of the nasal cavities (frog-face deformity).



FIG. 3. Internal surface of the skull; showing the honeycombed condition of the inner table. The photographs of the skull were taken by Dr. E. Harlow, to whom I am greatly indebted.



FIG. 2. External surface of skull viewed from in front; showing irregular defects in the outer-table.

II.-VII.

## OSTEOMYELITIS OF THE SKULL WITH EMPYEMA OF THE NASAL ACCESSORY CAVITIES; SINUS THROMBOSIS: PYÆMIA; DEATH; AUTOPSY.

BY DR. ARNOLD KNAPP.

(*With three illustrations on Text-Plates VI. and VII.*)

M. M., twenty-one years old, an Irish servant girl of good family history, began to suffer from nasal occlusion and discharge five years ago, on the right and, shortly after, on the left side.

She later suffered from headache and the nose externally slowly broadened out. She began treatment six months ago ; at least fifty polypi were removed from the nose, but with only temporary relief. She was then referred to me by Dr. C. B. Meding of this city.

*On admission : September 8, 1802.* Poorly-nourished young woman with a typical frog-face deformity. The nasal processes of the superior maxillæ are pushed forward and out and are situated about in the centre of the cheek. The lachrymal groove is occupied by a bony swelling, the displaced inner wall. Posterior to this, the internal orbital wall is pushed outward and prominent. The eyes are normal. On examining the nose, both nasal cavities are enormously dilated ; the lower meatus is broad and the inferior turbinal is small and pressed against the outer wall. Above this, the nasal cavities are completely filled with a mass of polypi, hypertrophied nasal tissue, and thick white pus. It is impossible to locate the path of the pus as there are no landmarks. On the left side the polypi extend into the naso-pharynx. No history of syphilis. Right old otorrhœa.

*Operation : September 9, 1902.* Morphine-ether narcosis. Incision beneath right eyebrow and along side of nose to floor of orbit.

After retraction of the orbital contents the periosteum is found so thin over the os planum as not to be identified. The bone itself showed two openings in about the centre, round and smooth, evidently pressure-atrophies. The tendon of the superior oblique lay bare. There was no orbital tissue between the eyeball and the os planum.

On making an opening over the naso-frontal duct, pus from the frontal sinus appeared. The floor of the sinus extended out for three-quarters of the orbital roof and was removed. The mucous membrane was found partly detached, greenish, and covered with granulations. After removing the lachrymal bone and os planum, polypi were encountered, but no pus. The ethmoidal labyrinth was like a cyst. The changes were most in anterior part of nasal cavities. Polypi anterior to the head of the middle turbinal were removed; then, with the curette, the entire mass occupying the ethmoidal lateral body was removed. Moderate bleeding, controlled by packing. Sphenoidal opening not identified, nor were posterior extremities of turbinals removed.

The patient stood the operation without much shock. On the following day there was some fever. T. 104°, P. 120, and the region about the incision became very much swollen, red, and painful, suggestive of erysipelas. The tumefaction, fever, and symptoms, however, disappeared in three days. At first there was no discharge from the nose. Later there was a slight discharge and the nose would become occluded with very large crusts. The wound-healing progressed favorably until September 22d. There was some swelling about the wound, and the region of the left frontal sinus was very tender. The patient complained of headache and of the teeth being sore. Some granulations at the edges of the wound were removed, together with some polypi which had formed in the nose externally above the inferior turbinal, internally on the septum, and posteriorly, covering the sphenoidal cavity. An attempt was made to remove these with a curette, but without much success on account of the pain. The swelling about the wound increased, the picture of cellulitis appeared, the periosteum seemed lifted up from the frontal bone, and the suppurative process extended to the other orbit. Free drainage externally was established and a tube inserted. The patient suffered, from time to time, with very severe left-sided headache, which would persist day and night. The left nasal cavity was completely occluded and there was a large quantity of purulent

discharge. At the same time she took her nourishment very poorly and became very much depressed. Temp.  $100^{\circ}$ - $101^{\circ}$ . The tenderness over the floor of the left frontal sinus suggested a retained empyema. While the condition of cellulitis persisted, it was thought best to defer opening the left accessory cavities.

*October 5th.* The conditions have somewhat improved. There is less swelling of the soft parts, and the condition inside of the nose seems cleaner.

*October 7th.* During the last two days the pain has again become very severe, and, though there still seems to be some superficial infection under the skin, operation is decided upon to relieve the left frontal sinus. The regions of the nose, forehead, and adjoining parts of the orbit are edematous and swollen. The incision on the right side is contracted down to a short tract which passes directly backward into the frontal sinus of that side and also leads under the periosteum and skin of the forehead.

*Operation: October 7th.* A curved incision was made on the left side along the supraorbital margin down along the nose to the naso-labial fold. The subcutaneous tissue and periosteum were very much thickened. The periosteum seemed to be converted into granulations and was lifted up from the bone on the forehead and over the nose. It was possible from here to reach the communication from the wound on the other side. The bone was bare and rough. The entire area was curetted. The orbital contents were then separated from the upper and inner wall of the orbit. A similar condition to that described on the right side was found—namely, protrusion outward of the lachrymal and ethmoid bones, so that there were no orbital contents between the bone and the eyeball. The os planum was so thin that in places there were defects showing the underlying swollen mucous membrane. The frontal sinus was first opened into by removing the entire lower wall. It was found completely filled by an enormously thickened mucous membrane containing cysts. There was no pus and no perforation could be seen. The nasal process of the superior maxilla and the bone just back of this was then removed. A circumscribed mass composed of glassy swollen mucous membrane presented, corresponding to the anterior extremity of the ethmoidal labyrinth. The ethmoid was found converted into a mass of granulations and a polypoid degenerated mucous membrane. With one finger in the nose, as much of this loose tissue and thin bone as possible was removed with the curette. The

roof of the ethmoidal labyrinth appeared healthy. The disease extended quite far back, covering the sphenoidal opening, and in this region it was impossible to remove all the sharp projections of bone. The main part of the disease seemed to be situated in the anterior part of the ethmoid, corresponding to the dilatation of the nasal bones, though the septum, as far as could be seen, was not involved. Externally the nasal bones seemed to have become separated. The left nasal bone, more or less loosened and white, was removed. Before conclusion the right cavity of the nose was examined and some granulations which had formed anteriorly, posteriorly near the sphenoid, and externally just back of the inferior turbinal bone were removed. There was considerable hemorrhage which made the work on the left side particularly difficult.

Patient recovered from the operation without any shock.

During the next fourteen days patient much better, no headache. T. about  $101^{\circ}$ .

*October 20th.* Some frontal headache. Eyelids swollen.

*October 23d.* Symptoms relieved after removing some granulations about left middle meatus.

*October 24th.* Swelling extended up over right frontal eminence.

*October 29th.* Fluctuating swelling in this position; incision, evacuated thick pus from under periosteum. Does not take her nourishment well and is failing generally.

*November 3d.* Another opening made lower down in median line. Headache continues. Doughy swelling over forehead.

*November 6th:* Ether. Central vertical incision, opening up both lateral abscesses under periosteum, bone found roughened. Granulations and polypi removed from both nasal cavities. Both maxillary antra contained pus.

Suppuration on forehead gradually diminished. Right eye slightly prominent and swelling of upper lid for two days. This diminished. Diplopia. Teeth became very tender. Pain in head. T. varies  $100^{\circ}-101.8^{\circ}$ .

A week of relief from symptoms. Much brighter and takes nourishment well.

*November 15th.* Pain in teeth, forehead, and top of head.

*November 27th.* Swelling in right temporal region, later in left temporal region. Occipital headache. General condition better; some stiffness of jaw.

*November 30th.* Right temporal swelling opened; much pus

from under periosteum evacuated. Left incised; no pus. Fore head wounds doing well. Left lower orbital margin swollen. Swelling on top of head.

*December 5th.* Headache. Considerable discharge from external wounds.

*December 16th.* Treatment with mercurial inunctions and potassium iodide begun.

*December 20th.* Abscess in left cheek and at orbital margin opened. Deep pus beneath periosteum.

*January 1, 1903.* Deep abscess left temporal region opened.

*January 10th.* Condition much improved; wounds healing; in centre above roof of nose bare and black bone exposed.

*January 20th.* A swelling formed at lower margin of right orbit, closing lids. Incised; pus escaped, coming principally from outer surface of superior maxilla. A succession of soft circumscribed swellings developed, occupying both temples and the scalp half way back, also over right mastoid (old otorrhœa); incision evacuated thick yellowish matter surrounded by a thickened ring of periosteum, the bone underneath was roughened, the diploë exposed and granulating. No particular change in nose.

*February 14th.* During last three days, thin pus has flowed from all openings (streptococcus); the general condition is not so good. T.  $102^{\circ}$ . Pain behind right ear.

*February 16th: Operation;* with the kind assistance of Dr. Bolton. Vertical wound in forehead enlarged. A sequestrum beginning to demarcate and partly loose. It was removed; it measured  $2\frac{1}{2}$  to 3 by 2 cm and included lower and anterior part of frontal bone down to nasal bones, and laterally some of the anterior wall of the frontal sinuses. An underlying cavity was filled with granulations; the margins of orbital plates and dura covered with granulations were exposed. No especial hemorrhage. The incisions in the scalp were connected by a lateral incision extending over the head and the periosteum was retracted. The bone was superficially necrotic, ulcerated, with granulations springing from diploë. The outer table of the bone was removed. The dura was exposed in two places and was apparently normal. The infiltrated area above right mastoid opened, pus evacuated; the small opening found in the squama in bone enlarged, dura exposed, covered with granulations.

Condition good. After this operation patient did surprisingly well; scalp wound and forehead rapidly assumed a healthier aspect. The nasal discharge was much less. The wound above right ear, however, did not improve, continued to discharge, and the patient referred all her pain to this region.

*February 22d.* T. gradually began to go up.

*February 25th.* T.  $184.2^{\circ}$ . P. 130. Complained of pain about right ear. No chill. Right ear contained granulations and epidermis scales. Wound in squama unhealthy and discharging. Induration in right subocciput and about root of jugular vein.

*February 25th: Operation.* Suboccipital area exposed. Negative, except mastoid vein was found thrombosed. Mastoid process opened, sclerosed; antrum contained granulations and debris. No extension. Going up and back an epidural abscess exposed situated over the commencement of sigmoid sinus. Removing cortex, this was found to communicate with upper opening; the sinus was then exposed down and back. It was thickened and hard. Anterior wall very thick. On incision a grayish firm thrombus removed. Cerebellar surface of sinus normal. Hemorrhage from above. With spoon contents removed towards bulb. No hemorrhage from this extremity.

*February 26th.* T.  $101^{\circ}$ . P. 108. Face drawn to left. Facial nerve presumably injured in attempt to expose bulb.

*February 27th.* Cough; pain between scapulæ. Respiration 32. Wound dressed, some pus from bulb. Lower half left chest-dulness on percussion, absence of breathing.

*March 1st to 4th.* Patient's general condition became gradually worse. Complained of pain in chest. Lower half right lung became involved. Pyæmic temperature  $99^{\circ}-105^{\circ}$  daily variation. No chill. Pain in chest. Difficulty in breathing. No expectoration. Double optic neuritis with hemorrhages. Mastoid wound discharged pus. Parietal wound unclean, at centre; the bone appeared to be involved farther back. The wound over nose very clean. Some pus from nose. Some induration along right jugular vein. Gradually grew weaker. Restless and some delirium. Died rather suddenly at 11 A.M.—March 14th.

*Autopsy, 5 P.M.* Extremely emaciated cadaver. Wounds in forehead leading down to diseased bone. The central wound is quite deep, partly filled in with granulations. On top of scalp running from one side to the other a band-like area of exposed

bone, with granulations, discharge, and necrosed bone. In the right mastoid region large wound; cerebellar dura exposed. On retracting the galea a large periosteal abscess is found above and back of mastoid wound. The frontal bone shows disease in a band-shaped area 1 inch broad and extending from side to side; the outer table of the bone is missing, it had partly been removed at operation. The diploë is irregularly necrosed and covered with granulations; in two places the underlying dura is exposed. The process had stopped short of the coronal suture, except at two places in the centre where it has recently extended backward. The inner surface of the calvarium showed a honeycombed condition of the inner table of the left frontal bone. The adjacent dura was irregularly covered with small beads of granulations corresponding to the depressions in the bone. No pus on dura and no evidence of the process having passed this membrane at any point. The dura was incised; the meninges on the cortex appeared normal. After the brain was removed, the pia at the base from the chiasm backward to the pons was found clouded and thickened. The ventricles were distended with turbid fluid. No abscess or gross lesion. The right cavernous sinus was thrombosed. The thrombosis extended backward from the mastoid wound to the torcular and for some distance along the lateral sinus of the other side and the superior longitudinal sinus. The thrombus at the torcular was converted into an abscess. The dura on the base seemed normal; the cribriform plate showed no perforation. The nasal cavities exposed by removing the roof; the sphenoidal and maxillary sinuses contained thick pus. The walls of the nasal cavities, except the septum, showed thickening with infiltrated, polypoid mucous membrane. The jugular bulb contained a partly disintegrated and firm thrombus. The internal jugular vein showed a very much thickened wall; just below the bulb the lumen was contracted to the diameter of a probe, lower down it became dilated and was filled with thick pus. At the clavicle the purulent process in the vein was shut off as by a valve and the innominate vein contained fluid blood.

*Remarks:* The extent of the pathological changes found in the nose, sufficient to produce a distension of the neighboring structures, seemed to suggest a tumor. Microscopic examination of several pieces of tissue including bone showed only the ordinary inflammatory changes. There

was no history of syphilis and rigorous antisyphilitic treatment had no influence on the process. By removing the inner bony orbital wall access was had to the nasal structures, first on one side and at a later operation to those on the other. The morbid process was most intense at the extreme anterior extremity, where the nasal bones were pushed apart; one of these bones was necrotic and was removed. Both nasal cavities were successfully cleaned out except the posterior part of the lateral walls. Both frontal sinuses were involved. No reaction on the part of the orbital structures followed the operations, and the nasal condition was improved. The infection, however, extended upward in the diploë of the frontal bone. An osteomyelitis of a low-grade intensity spread upward and backward. After an interval of some weeks, deep subperiosteal abscesses developed in succession over the frontal eminences, the lower orbital margins, the temporal fossæ, and the vertical process of the frontal bone anterior to the coronal suture. Incision evacuated pus (*streptococcus*) underneath the periosteum collected in a circumscribed area, the bone in the centre showing an irregular defect in the outer table and granulations arising from the diploë. The process at no point appeared to have involved the inner table of the bone. Subsequently an abscess formed in the squamous portion of the right temporal bone about 3 cm above the mastoid fossa. On incision the entire thickness of bone was found involved and the dura lay bare covered with granulations. This wound did not do well. The temperature, which had previously varied between 100° and 101°, rose abruptly and the right suboccipital area became indurated. Involvement of the sigmoid sinus was suspected, and on enlarging the wound in the squama backward an epidural abscess was found situated over the upper knee of the sigmoid sinus. The sinus was filled with a thrombus and was completely evacuated. Signs of pyæmic extension had already become marked in the lungs. The eye-grounds presented a very marked optic neuritis with hemorrhages. Under the picture of pyæmia the patient died rather suddenly after fourteen days, or six months after the first operation.

The autopsy showed that the inner surface of the bone over the left frontal lobe was honeycombed, a dilated condition of the natural channels in the bone; the underlying dura was covered with small granulations corresponding to the depressions in the bone. There was no free pus; the process had evidently been kept in check. No meningitis. The thrombus of the torcular was converted into an abscess. The ventricles were distended with turbid fluid. The jugular bulb was filled with a partly softened thrombus, and the jugular vein just underneath was nearly obliterated; in the neck the walls of the vein were very much thickened, and the lumen was filled with pus. This was sharply shut off at the junction with the innominate vein. The sphenoidal and maxillary sinuses contained pus. The chest cavity was not examined, but presumably would have shown the lesions of metastatic pneumonia and empyema.

In brief the morbid process began as an inflammation of all the parts of the ethmoid bone (an osteomyelitis), associated with empyema of all accessory cavities of the nose; then an osteomyelitis of the frontal bone set in, extending to the squamous portion of the temporal bone on one side and causing an epidural abscess with thrombosis of the sigmoid sinus, pyæmia, and death.

## A DISCUSSION ON THE DIFFERENTIAL DIAGNOSIS AND THE TREATMENT OF OSTEO-SCLEROSIS OF THE MASTOID PROCESS.<sup>1</sup>

By OTTO J. STEIN, CHICAGO, ILL.

THE mastoid process of the temporal bone in the first few years of life is composed of fine cancellated bone tissue, which gradually undergoes absorption, giving place to the presence of a series of more or less well-formed air cells (1).

These cells communicate with one another and sprout, as it were, from the parent cell or antrum. They are lined with the same delicate and highly vascular mucous membrane as that found in the tympanum and antrum.

The mucous membrane lining the mastoid cells plays a double rôle, in that it is mucous membrane to the cell cavities, and periosteal covering to the bone. The cells receive their secretion from the membrane; the bone, its nourishment.

A chronic congestion of the membrane results in a low grade of inflammation that tends, on the one hand, either to thickening or to pus formation, and, on the other hand, to an osteitis with a resulting hyperostosis, caused by the hypernutrition; or pus formation as the result of caries or necrosis.

These conditions, of course, may co-exist or occur independent of one another. The hyperostosis may exist as an idiopathic disease, the result of a previous inflammatory

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<sup>1</sup> Read before the eighth annual meeting of the Academy of Ophthalmology, and Oto-Laryngology, held at Indianapolis, Ind., April 9, 10, and 11, 1903.

condition of the tympanum or antrum, but developing itself after the latter had subsided ; and, on the other hand, it may develop as an accompaniment to an active morbid condition within the tympanum or antrum, or both.

In the hyperostosis we have the formation of new bone cells from the periosteum and also from the medullary spaces. This proliferative process may continue so that all of the cells may be obliterated, the new bone tissue finally becoming so compact and hardened as to merit the name of "ivory-" or "ebony-like." This process is known as osteosclerosis or eburnification of the mastoid bone.

It is very easy for us to trace the development of our knowledge on this subject, because it is a knowledge of but comparatively few years.

The first recorded reference to the subject that I could find is in the early writings of Schwartze and Politzer. Vague, incomprehensive, and perhaps doubtful as they may have seemed, they nevertheless directed the inquiring and progressive otologic mind in the direction that has developed into a knowledge that to-day gives to the subject a distinct and individual place in the pathology of mastoid disease. What the subject still lacks, though, is a clinical picture that will awaken in the mind of the otologist the necessity of differentiation between conditions productive of similar symptoms, which, thoroughly understood, gives to him the requisite conviction to apply a remedy potent with decided and prompt relief.

Schwartze (2) says: "Sclerosis is a frequent sequence of chronic purulent inflammation of the middle ear, the cells gradually contracting and finally disappearing."

In the report of the American Otological Society of 1870, Dr. C. R. Agnew (18), of New York, probably makes the first recorded reference to this condition, in the following words: "Caries is not the invariable and immediate result of mastoid-cell disease, but sometimes there may be, instead, an osteitis, with hyperplasia of the bone, filling a few or all of the cells."

From this time on several investigators followed up the subject very carefully, and in 1873 Buck (3), in an article on

mastoid disease, referred to the condition under the head of Hyperostosis of the Mastoid Process.

Shortly following upon this time, 1876, J. Orne Green (4), of Boston, Mass., as is shown in the *Report of the International Otological Society of 1876*, and in the *Transactions of the American Otological Society of 1880*, attempted to diagnose a specific mastoid disease known as Hyperostosis of the Mastoid Process; and three years later Dr. Arthur Hartmann (5), of Berlin, published in the *ARCHIVES OF OTOLOGY*, 1879, a paper in which he sets forth a statement recognizing that an idiopathic disease of the mastoid process may exist as an osteosclerosis with definite symptoms.

In all the four cases reported by Green, in 1876, in connection with his article on Hyperostosis of the Mastoid, there was present a chronic purulent inflammation of the tympanum, associated with the hyperostosis of the mastoid, and sudden acute symptoms arising, operations on the mastoid were carried out, with the result that nothing but a hyperostosed condition was found, although complete relief from pain was brought about by the operations.

In three cases reported by Buck (6), in 1883, all were associated with running ears in their early history. One case was lost sight of, the others were operated upon solely for the mastoid pain, the discharge having stopped for years, and complete relief was afforded after the patient had suffered for several months.

A most excellent exposition of the condition is given by J. A. Lippincott (7), of Pittsburg, Pa., in his report of "A Case of Mastoiditis Interna Chronica with Sclerosis," before the seventeenth annual meeting of the American Otological Society, 1884. In this case, like the two cases reported by myself (8), the chief symptom was pain, without any marked evidence of existing middle-ear disease that would otherwise demand relief. This case, like my own, made an excellent recovery after trephining the mastoid process.

From the foregoing remarks it will be seen that there are two varieties of this condition: one where the sclerosis is associated with a suppurating process within the tympanum or antrum, and the other without any associated suppura-

tion. It is with the latter that I wish to deal particularly. In this latter variety we may include those cases that may have a history of a former suppuration, as well as those in which no such history or existing evidence can be had.

In the simple or uncomplicated variety of mastoid sclerosis the symptoms are few in number. Hence it becomes a matter more of differentiation between disorders with similar symptoms. No doubt many cases of hardening of the mastoid process exist wherein the patient complains but little or perhaps not at all. But in cases where pain is complained of, there is little else, aside from this symptom, that remains characteristic of the disorder.

Hence pain is the preponderating symptom present, and one from which the patient seeks relief. The subject, therefore resolves itself into a discussion of the varieties of ear pains and their characteristics.

A chronic pain in or around the ear may be studied under four heads:

First, otalgia, associated with an internal or middle-ear or antrum trouble.

Second, hysteria, neurasthenia, and malingering.

Third, neuralgia from other causes than ear troubles.

Fourth, osteosclerosis of the mastoid process.

*Otalgia from Associated Ear Troubles.*—Pain, as a result of trouble with the external, middle, or internal ear, reveals its true character mainly in its association with such disturbances. As, for instance, a foreign body or a neoplasm within the ear canal is seen upon careful inspection, and with the removal of the same the pain disappears. Pus, granulation tissue, or cholesteatoma in the middle ear or antrum may be demonstrated either by ocular examination, the use of the probe, microscopic examination of the washings of the ear, and by other well-known methods. In all these conditions the character and duration of the pain differ from that of osteosclerosis, in that it seldom reaches the acute exacerbation; nor is it so persistent or prolonged, and, as a rule, it is amenable to some of the ordinary measures of treatment.

*Hysteria and Neurasthenia.*—The chronic pains of the malingerer, the hysterical, or neurasthenic may at times be

more difficult to differentiate. In all such cases we must be broad-minded and far-seeing enough to take into consideration the entire domain of medicine. For instance, in order to eliminate the possibility of a neurasthenic condition, we must ask ourselves whether our patient is suffering from the results of an exhausted state of the general nervous system. Is he in a depressed mental state, associated with a worn-out and tired feeling, lacking ambition during the day and wakeful at night? If so, further inquiry will reveal the fact that he has been working under pressure or at a high tension. Long, hard days, and perhaps nights of exacting or tedious duties, coupled with a disregard for proper eating and necessary exercise, establish in the mind of the physician the true nature of the malady.

On the other hand, should our study of the case bring to light some of the following symptoms, we may reasonably suppose that we are dealing with a condition of hysteria: an inclination to complain of the physical or mental state; a tendency to exaggerate existing symptoms; given to extreme expressions of emotions; great imagination; subject to disorders of sensations, like globus hystericus, tinnitus aurium, epigastric pains, headaches, eructations, tympanites, chilly sensations with yawning and stretching, diuresis, muscular twitchings, cramps, convulsive attacks, neuralgia, hyperæsthesia, anaesthesia, analgesia, aphonia, functional paralysis, cough, retention or suppression of urine, rigidity of neck, tenderness of nape of neck, etc.

So much for generalities. Now let us look more particularly at the aural symptoms. In the earache complained of by the hysterical the pain more frequently is located in the auditory canal and in front of the ear. Besides, pain is referred to the temple. The mental state, as well as the condition of the general health, influences the severity of the pain. That is to say, when the patient is much depressed he is sure to complain most; but when his spirits are at their best he complains none at all, or but little, and then the location of his complaint is but ill-defined, or it is located in an entirely different place.

One of the characteristic things about hysterical affections

of the ear, as Gradenigo (9), Politzer-Brühl (10), and others have pointed out, is that there is an association of sensory disturbances about the parts. While the patient may complain very severely of pain within the ear and about the mastoid region, careful examination frequently discloses anaesthetic or hyperaesthetic areas about the pinna or auditory canal, as well as in other parts of the body. Moreover, the patient may complain of paraesthesiae sensations somewhere within or about the ear, like a sense of formication within the canal, or as if there were something animate within, and again as if there were a slight discharge. Some cases present neurotic disturbances of the eighth nerve, manifesting themselves either as a hyperacusis or paracusis, tinnitus aurium, periods of momentary deafness, nausea, and vertigo. In other cases there may be present transitory disturbances of the motor nerves of the face, like twitching of the muscles or even a paralysis. Often the opposite ear becomes involved without any objective symptoms.

Voss (11), in discussing the subject of ear disease and hysteria, says the diagnosis of hysteria must in the first place be supported by heredity; the disturbances of cutaneous sensations are important; the anaesthesia varies as to time and place; the tuning-fork generally is not heard by bone-conduction on the affected side; and finally, the condition is generally found in women between the ages of twenty and thirty years.

Lannois and Chavanne (12), from their large experience and the great number of cases treated, advise the employment of suggestion in the treatment of hysterical mastoid cases. Their good results in these cases give to us an additional means of differentiating between an imaginary and a real affection.

Jendressik (13) describes a number of cases of neurasthenic neuralgia and says the subjects always exhibit the stigmata of neurasthenia, and that a hereditary predisposition can be almost always discovered. There are none of the objective phenomena which accompany genuine neuralgia. The patients are able to keep their mouths and teeth clean, and like to do so when the neuralgia is in the face,

while in genuine neuralgia they shrink from the slightest contact with the parts.

*Neuralgia from Other Causes.*—Under the heading of neuralgias we have a long list of disorders that may give rise to ear pain. The pain due to chlorosis, anæmia, malaria, and influenza may, aside from other symptoms diagnostic of their nature, be differentiated by characteristic conditions of the blood as found in these representative disorders.

It is very proper at this point to emphasize the importance of securing additional aid to clear up the diagnosis, by the examination of the blood and urine. The examination of the blood has become almost a universal practice among surgeons of to-day, and particularly as to its significance in acute suppurative processes (16). It is interesting to note in this connection a case reported by M. D. Lederman (14), which clinically simulated mastoiditis, but on exploring the mastoid process nothing was found, the case afterward proving to be one of malaria.

In case of syphilis, the history of an infection and the knowledge that the pain is not so persistent but characteristically severe at night, are usually sufficient upon which to form an opinion.

In rheumatism, the involvement of other parts of the body, the marked periods of remission from pain, and the aid received from urinalysis suggest the nature of the disorder.

Ear pains as a reflex expression of a disordered condition are not uncommon. Instances of such disorders are seen as the result of diseased teeth, gums, and the tongue. Körner (15), in discussing neuralgia of the ear, refers to a case of tympanic neuralgia due to an abscess in the tongue. The pain was increased when pressure was exercised on the hyoid bone. He has repeatedly observed the increase of pain in the ear of tympanic neuralgia from carious teeth, on pressure in the hyoid region, and considers this a diagnostic symptom.

Other reflex pains may arise from nasal or laryngeal disturbances. Pain in the ear has been reported as a result of

caries of the vertebræ, and similar reflexes have originated from the brain and sexual organs.

The pain of a neuralgia shoots in the direction of a nerve trunk and its branches. In cervico-occipital neuralgia the painful and tender points are situated as follows: between the mastoid processes and the cervical vertebræ; on the parietal side of the head; on the mastoid process; in the concha, and it may also be manifested in the temple and the ear canal. A point well borne in mind is that cold or heat, when applied to the affected nerve or its branch, frequently aggravates the pain.

One will at times observe neuralgia in a case of debility following a siege of some acute affection or some chronic disease.

*Osteosclerosis of the Mastoid Process.*—The symptoms of osteosclerosis are mainly centralized into that of pain. In the uncomplicated variety of this disease the almost negative results of our examination strengthen our diagnosis. On inspection of the drum membrane, most likely nothing of any note will be seen, although it may show the usual changes that are present as a result of a former otitis media catarrhalis or suppurativa. The retro-auricular region seldom shows anything pointing definitely to the involvement of the interior. In some cases, particularly when accompanied by a chronic suppuration of the middle ear, or in cases of cholesteatoma and also in the formative stage of the simple variety, we may discover a slight redness of the overlying skin and a light degree of œdema. Firm pressure over this area will discover a spot, usually located on a line with the meatus, that elicits a sharp sensation of pain. The tenderness is not limited necessarily to this region, but at times it may extend over quite a large area. But what is particularly worthy of note is that the auricle, integument lining the auditory canal, the region in front of the tragus and just beneath the lobe of the ear, are not at all sensitive to the touch.

The pain complained of by the patient is almost always continuous and extends over a long period, from days into weeks, and weeks into months, with only remissions, but

seldom intermissions; although at times, by the mere fact of its long continuance, the patient may become so accustomed to the milder stages of the pain as to be apparently unconscious of its presence.

The pain is accompanied at times by sudden exacerbations of an acute throbbing or boring character, deeply seated in the ear and mastoid process. In some instances it may radiate up to the side of the head and down into the neck and again back to the occiput, but, as a rule, it is not associated with pain in or anterior to the meatus.

Deafness may be complained of according to the amount of involvement of the conductive or perceptive apparatus.

Usually there is an absence of tinnitus and vertigo.

A slight rise of temperature may be noted in the early stage of the disease when the new bone tissue is forming, but later, during the hardening period, it is never present.

Age does not seem to bear any causative relationship to the disease.

The employment of auscultation, percussion, or transillumination has as yet proven of no convincing value to me in the diagnosis.

One final word now as to the possibility of error in determining between a purely neurotic disorder and one of osteosclerosis, and that is, in the proper individual, who is susceptible and impressionable, the persistent, nagging, torturing, and often agonizing pains incident to a case of osteosclerosis, may soon bring forth the latent qualities of a full-fledged hysteria, just as it brings forth the demand for powerful sedatives and analgesics to relieve him of his suffering, until finally he finds himself a helpless, miserable, and pitiful subject of the drug habit.

*Treatment.*—In considering the treatment of this condition, we may divide the subject into the medical and the surgical.

Under the medical treatment we will refer to all such measures employed other than that of operative.

Remedies of this class, to be of any particular value, should be used in the early stage of the disease—that is, where there is great vascularity as a result of the new bone-

forming process. At such a time the various rubefacients or epispastics may be tried, such as mustard, capsicum, cantharides, ammonia, camphor, and turpentine. The methods of "firing" and acupuncture are little used nowadays, but in their stead we may find the employment of the X-rays and mechanical vibrations. The leech, dry cups, and galvanism are remedies familiar to all.

The surgical treatment is the important part of the therapeutics of the disease. Notwithstanding the advice and practice of such authorities as Politzer (23), Hartmann, and Knapp, one is amazed at the apparent apathy, part ignorance and also prejudice, existing relative to the employment of operative measures in this particular condition.

As far back as 1875, Professor Gosselin (17) read a paper before the Paris Academy of Sciences, entitled "Osteo-Neuralgia of the Long Bones," in which he advises trephining in order to relieve the pain. That this same view is held to be applicable in cases of osteo-neuralgia of the mastoid is seen by reading the opinions of men like Politzer, Green, Buck, Hartmann, Schwartze, Knapp, and others.

Buck says: "We should not hesitate to perforate the bone," in order to bring about relief in these conditions.

Schwartz (19), the pioneer in mastoid surgery, the man to whose personal efforts through research and indomitable courage aural surgery owes a great deal of what is good and beneficial to-day, advocated and practised operating on the mastoid in cases of intense and uncontrollable pain of the mastoid process.

Hartmann (5) says: "Practice proves that the symptoms of violent pains, in connection with idiopathic sclerosis, can be relieved by opening the mastoid process."

Sattler (20) cites numerous cases illustrating the condition under discussion, which upon operation gave permanent relief.

Herman Knapp (21) has repeatedly operated for osteosclerosis of the mastoid process, with success as to the relief of pain in all cases.

Trephining the skull is practised by many surgeons for the solitary symptom of headache. Siegel (22) cites such a

case and reports finding eleven similar interventions on record. All cases are reported cured by the operation.

As I have already stated in a previous paper on this subject, after having made your diagnosis and exhausted the simpler means of relief, an operation of opening into the process is the only rational, positive, and successful means of putting an end to the patient's suffering.

Where we decide to operate in a case associated with hysterical stigmata, it is important not to burden the patient's mind with any doubtful prognosis, but, on the contrary, carry conviction with our words by predicting a most hopeful outcome.

In operating, our object is to relieve bone tension, and with this in mind we should remove as large a core of bone as possible, making the superficial circumference of the opening of large diameter, and the edges and surface of the cavity clean and smooth.

In the uncomplicated variety of this disease, it may not be necessary to penetrate into the antrum. In fact, the rule is not so.

In conclusion, allow me to urge upon you the recognition of a broader field for surgical intervention in affections of the temporal bone. The modern surgery of the mastoid process has given to us the ways and means whereby serious symptoms and fatal results may be thwarted, and the revelations made to-day by such procedure explain the lethal cases of former years. Although the condition of sclerosis is not, as a rule, associated with the possibilities of a fatal issue, it very often makes itself manifest by such uncontrollable pain that it leads the patient a life of intolerable suffering, which evokes within him such a strong desire for relief that the drug habit is soon acquired. In the face of such a condition or such prospects, can we as otologists of to-day remain unmindful of the mental and physical deterioration that results from such state of affairs, and with a remedy so potent and powerful in our hands refuse to be moved by the sense of what is our proper and legitimate duty?

## LITERATURE.

1. STEIN, O. J. *The Laryngoscope*, vol. xii., No. 12.
2. SCHWARTZE. *Handbuch der pathologischen Anatomie*. KLEBS, Gehörorgan.
3. BUCK, A. H. *Archives of Otology*, 1873, vol. iii., No. 4.
4. GREEN, J. O. *Report Congress Internat. Otol. Soc.*, 1876; *Trans. Am. Otol. Soc.*, 1875-1881, vol. ii.
5. HARTMANN, A. *Zeitschr. für Ohrenheilk.*, 1879, vol. viii., 18-21; *Archives of Otology*, 1879, vol. viii.
6. BUCK, A. H. *Medical Recorder*, 1883, vol. xxiii.
7. LIPPINCOTT, J. A. *Trans. Am. Otol. Soc.*, 1884, vol. iii., pt. 3.
8. STEIN, O. J. *Chicago Medical Record*, January, 1903.
9. GRADENIGO. *Encyclo. für Ohrenheilk.*, 1900.
10. BRÜHL. *Atlas and Epitome of Otology*, 1902.
11. VOSS. *Zeitschr. für. Ohrenheilk.*, Bd. 40, 1902.
12. LANNOIS and CHAVANNE. *Annales des maladies de l'oreille, du larynx, du nez et du pharynx*, July, 1901.
13. JENDRESSIK. *Deutsche med. Wochenschr.*, vol. xxviii.
14. LEDERMAN, M. D. *N. Y. Academy of Medicine*, February 13, 1902.
15. KÖRNER. *Archives of Otology*, vol. xxvi., 1897.
16. KUHN. *Münch. med. Wochenschr.*, 1902, vol. xi.
17. GOSELIN. *British Medical Jour.*, 1875.
18. AGNEW, C. R. *Report of the Am. Otol. Soc.*, 1870.
19. SCHWARTZE. *Arch. für Ohrenheilk.*, vol. xiii.
20. SATTLER, ROBT. *Archives of Otology*, 1898, vol. xxvii.; 1899, vol. xxviii.
21. KNAPP, H. *Trans. Am. Otol. Soc.*, 1884; *Archives of Otology*, vol. x., p. 365.
22. SIEGEL. *Am. Medical Journal*, 1903.
23. POLITZER, ADAM. *Text-Book of Otology; Diseases of the Ear and Adjacent Organs*, 1902.

## THREE CASES OF ENCEPHALITIS IN CONNECTION WITH OTITIS MEDIA.

By DR. VOSS, RIGA, RUSSIA.

Abridged Translation by Dr. JULIUS WOLFF, New York.

STRÜMPPELL'S effort to trace the cause of cerebral infantile paralysis to an encephalitis has led to the publication of many articles upon this subject. Although these matters are of no direct interest to otologists, still it is evident that the picture of the so-called acute, hemorrhagic, non-suppurative encephalitis may also at some time be encountered in a patient suffering from an otitis media. In 1897 Oppenheim, treating the subject of encephalitis in Nothnagel's *Spec. Pathologie u. Therapie* (vol. IX., ii., 3d edition, p. 17), made the statement that while reviewing the literature he had been impressed by the fact that relatively often patients with encephalitis were also afflicted with an old or a recent purulent otitis. While demonstrating a patient before the Berlin Society for mental and nervous diseases on December 11, 1899, Oppenheim described the disease as follows: "In all five cases there developed, acutely and with the symptoms of an infectious disease, a cerebral affection which from the very outset presented, in addition to the general cerebral symptoms, focal symptoms, such as motor aphasia, usually in conjunction with right facio-brachial monoplegia (twice beginning with cortical epilepsy). Whereas the general symptoms usually quickly subsided, the focal symptoms alone persisted for some time."

The history of Oppenheim's case was as follows:

A student, seventeen years of age, had suffered since his first

year from double suppurative otitis media with occasional exacerbations. Last purulent discharge at Christmas, 1898; during the latter half of that year occasional dizziness, otherwise healthy.

*January 31, 1899.* In the evening complained of pain extending from the right ear into the right arm. That night repeated vomiting.

*February 1st.* In the morning, severe *clonic convulsions* on the right side of the face and in the right arm, followed by *loss of speech*. Temperature  $105^{\circ}$  F., no chills, no headache. At eleven o'clock that morning the convulsions returned and were succeeded by unconsciousness. Examination of the ear showed no signs of acute inflammation nor of retention. No point of tenderness to percussion on the skull; eyes normal. Treatment: calomel, icebag, leeches on the left side, phenacetin.

*February 1st.* *Paralysis of the right arm.* From February 2d to 6th slight general improvement, but during the following days temperature again rose, pulse fell to 54, vomiting, unconsciousness, and *paresis of right facial nerve*.

*February 11th.* After thorough emptying of the bowels and a hot bath, followed by sweating, the improvement became marked and progressive and the mind became clear.

*July 26th.* Still slight weakness of right facial nerve and hand. Complete motor aphasia. "Yes" and "no" was his whole vocabulary and words were repeated with difficulty. Ability to write was least impaired for he could put on paper many words missing in his speech. Writing could be interpreted to a certain degree and he was able to understand simple spoken words and sentences, e.g.: "stand up," "show your tongue," etc.

Oppenheim in this article states that the above is the third case in which he established a relationship between this acute non-purulent encephalitis and purulent otitis; he also refers to a publication of Jaksch (*Prager med. Wochenschr.*, 1895, No. 40) and states that recently he had been informed by Jansen of a case corresponding to his own observations.

All of his five cases took a favorable course and it was merely owing to the fact that in one of them a wrong diagnosis had previously been made elsewhere, which led to a trephining, enabling him to corroborate his diagnosis with an autopsy.

This case is published in the *Deutsch. Zeitsch. f. Nervenheilk.*, vol. xv., 1899, p. 2.

A seamstress, sixteen years of age, suffering for several weeks from moderate gastric symptoms, two days ago became afflicted with severe *headache, vomiting, dizziness, chills, and fever*.

*April 16th.* Patient's mind is clouded, temperature  $103.6^{\circ}$  F., pulse 140. Pupils are equal and react. *Paresis of left abducens nerve* and diplopia. The region of the left mastoid process, and the left side of the head and neck seem very sensitive to pressure.

The physician in charge, suspecting an empyema of the left mastoid bone and thrombosis of the transverse sinus, decided, on account of the gravity of the cerebral symptoms, to perform an immediate operation. When the mastoid process was opened no pathological conditions were found in either the periosteum or the cells, while a puncture of the bared sinus with the needle brought out only blood. The dura was not incised and paracentesis of the drumhead revealed nothing abnormal.

*April 17th-20th.* High temperatures and pulse, and marked restlessness.

*April 21st.* Development of *complete aphasia* and a *facio-brachial monoplegia* on the right side. Ability to understand spoken words is retained, but there is *complete motor aphasia*. Sensation even on the right side well preserved. No ocular symptoms.

Oppenheim's diagnosis was: acute non-purulent encephalitis of the left frontal lobe or the left fronto-central area. Prognosis doubtful, but favorable course not excluded.

On the following day there were clonic contractions of the right arm and leg. In the next few days *improvement in the patient's condition* showed itself, the mind becoming clearer and the right arm regaining some motility.

*April 26th.* Some words could be uttered, and on the next day the aphasia was no longer complete but merely ataxic. During the following weeks speech returned fully and the paresis of the right arm disappeared. The operative wound made very slow progress toward healing and in June it was noticed that the bandage was frequently saturated with cerebro-spinal fluid. Through this poor condition of the wound the patient's general health

suffered, and she complained of headache and vertigo. An operation to cover the raw surface was, therefore, decided upon and undertaken on July 30th. The bone was found to be soft and brittle and had to be removed so extensively that the sinus and bulb were exposed. (At the autopsy the diseased bone was found to reach to the internal meatus.) The large cavity was tamponed with iodoform gauze and for some days the patient did well.

*August 23d.* Severe brain symptoms set in, and on September 17th she succumbed. The autopsy revealed purulent cerebro-spinal meningitis and a thrombus one and a half inches long in the jugular bulb, broken down in its centre. Besides the changes caused by the meningitis there was a diseased focus in the left frontal lobe in the region of the third left frontal convolution and the foot of the anterior central convolution.

This case teaches us that, in addition to the group of symptoms as described in the beginning, there may be present another and very important symptom—namely, tenderness on pressure or tapping of certain parts of the skull.

This pain has been observed in various parts of the skull. But for us it is of vital interest to know that it may occur in the region of the ear and thus may be the occasion for an operation. It has even been observed in this locality when there was no ear-trouble present, as in one of Oppenheim's earlier cases.

Another of the symptoms of encephalitis that has been observed in cases without aural disease, which I wish to mention as interesting us particularly, is choked disc.

The diagnosis of hemorrhagic encephalitis has also been made by me in the following cases, but not till after the operation.

CASE 1.—In a patient suffering from left acute purulent otitis media and on whom I performed the mastoid operation, there occurred on the evening after the operation a sudden *rise of temperature* to  $102^{\circ}$  F. accompanied by *aphasia*, drowsiness, and, as the temperature began to fall, a *slowing of the pulse* to fifty-six beats per minute. At the same time the mastoid bone was tender, especially at a point above and behind the ear, superior to the antrum. At the operation pus and granulations were found in the spongy portion as well as in the antrum. The bone adjacent

to the dura was not diseased. The dura, laid bare and incised, was normal and the subjacent temporal lobe had a dark bluish-red appearance. Punctures of the latter in every direction revealed no pus. The patient recovered in a short time after the operation. Naturally it was impossible to ascertain the extent of the disease during the operation, since only 2 or 3 *sq cm* of the temporal lobe were exposed. There was no softening of the brain; on the contrary, the consistency was, if anything, firmer than normal. I mention this particularly because the patient's wife claimed a traumatism had preceded his illness.

I resorted to the operation on account of the threatening brain symptoms, without knowing about Oppenheim's article. My attention was drawn to it only when I presented the patient before the Society for General Practitioners at Riga. Whether the operation, according to Oppenheim, was unnecessary or whether it contributed to a more rapid recovery I do not venture to decide. I can merely state that the aphasia disappeared completely in ten days.

CASE 2.—On the eleventh day after a left-sided radical operation there occurred a single rise of temperature to 99.8° F. with headache and drowsiness, and with the pulse slowing down to 48, and the patient became aphasic. Here also there was a distinct point of tenderness above and behind the wound which showed no sign of inflammatory reaction. Later paresis of the right abducens appeared. A second operation exposing the middle cranial fossa was performed. The expected abscess of the temporal lobe was not found, but there was extensive hemorrhagic softening of this lobe, corresponding exactly to the sensitive spot. Punctures with the scalpel showed that at one point the softening had already turned into suppuration. This purulent focus was discovered by mere good luck through a bead of pus on the blade after one of the punctures. In spite of an ensuing erysipelas the disease took a favorable course for a time. Later a prolapse of the brain appeared, and when this was removed with the Paquelin cautery an abscess, the size of a pea, was found in its centre. Whether this second focus of suppuration was not brought about till afterwards by the intercurrent erysipelas, or was present from the beginning, cannot, of course, be positively determined. But so much may be said quite definitely, that this small abscess could

not have produced all the severe cerebral symptoms, which evidently were caused by the extensive encephalitis.

This case teaches us that the early appearance of focal symptoms (in this case aphasia) cannot be considered as pathognomonic of a non-purulent hemorrhagic encephalitis; as in the hemorrhagic form of the disease, pyogenic germs may have entered and, therefore, an operation might save life.

CASE 3.—A woman, fifty-five years of age, had suffered for a week from severe pains in the right ear and on the right side of the head. Her speech was peculiar owing to marked trismus and she could separate her teeth only  $\frac{1}{4}$  cm. Some tenderness over mastoid, right membrana tympani much congested and dull. Hearing lost, temperature  $100.2^{\circ}$  F. Paracentesis was deferred to the next day when the patient was to enter the hospital. She did not return until three weeks later and then was in a moribund condition.

The autopsy showed the articulation of the inferior maxilla to be normal. The dura was adherent to the pia in many places. Considerable oedema of the latter over the parietal lobes. On the lower surface of the right temporal lobe there is a yellow and softened spot in the cortex, the size of a twenty-five-cent piece.

The disease in this case being on the right side there was, of course, no aphasia. Whether the rigidity of the jaw was of central or peripheral origin further observations must teach. This patient died in consequence of encephalitis following her ear trouble. I leave the question open whether an early operation might have saved her life.

I am inclined to consider the three cases described here as three stages of one and the same disease, and not to place the hemorrhagic non-purulent form into a class by itself. From this it follows that I consider an operation indicated in these cases also—that is to say, of course, only when the encephalitis is dependent upon a suppurative otitis media. This question can only be cleared up by further publications, and to aid in this was, indeed, the main purpose of my contribution.

REPORT OF THE TRANSACTIONS OF THE OTOLOGI-  
CAL SECTION OF THE NEW YORK ACADEMY  
OF MEDICINE.

MEETING OF MARCH 12, 1903. THE PRESIDENT, EDWARD B.  
DENCH, M.D., IN THE CHAIR.

*Presentation of Cases.*

Dr. TOEPLITZ presented a case of **perichondritis**. The illness began six weeks ago with pain in the ear. A diagnosis of subacute otitis was made and paracentesis was performed. Pain shortly after developed at the anterior meatal wall. Later, the whole tragus became swollen, and it was again incised. Notwithstanding, the swelling and infiltration proceeded backward and below, occupying the lower part of the concha. Incision was made through the cartilage extending below the auricle and a compressive bandage applied.

**Subperichondrial abscess** cured without deformity.

Dr. H. KNAPP presented a girl of five years, having been under his care for the above affection. When first seen, January 22, 1903, the cartilaginous walls of the concha, including the crus and spine of the helix, were swollen and bluish, under the spine fluctuating. The calibre of the ear canal was narrowed, containing thin pus. The child had suffered from otorrhœa for a month; the palatal and pharyngeal tonsils were swollen. Dr. Knapp, making the diagnosis of a perichondritis consequent to the acute purulent otitis media, incised the posterior wall of the cavum conchæ and the lower wall of the spine of the helix. Thick pus escaped, not the thin, flocculent liquid seen in chronic perichondritis. Probing discovered an extensive abscess cavity, whose cartilaginous wall was smooth and firm, extending to the osseous portion of the ear canal. Using the probe as a director, he split

the postero-inferior meatal wall in its whole length, and scraped the cartilaginous wall with a small sharp spoon, in order to leave no degenerated parts in the wound. The cavity was carefully wiped, and then packed with sterilized gauze. The ear canal and tympanic cavity were thoroughly wiped with absorbent cotton, the ear bandaged, and the patient kept in the hospital until the next afternoon. There being neither pain nor discharge and the tampon being dry, the patient was sent home without changing the dressing.

Four days later she came again: no pain, no discharge, the tampon, though soaked with dried secretion, perfectly inodorous, and the ear free from secretion and pain; the dressing was left in place, and the patient sent home again. In a week she returned, and as all signs of inflammation had disappeared the tampon was removed; this was done without pain or blood, the wound being dry, as if it had been exposed to the air for a week.

Two weeks ago, that is, about six weeks after the operation, I examined her again. The auricle was healthy and in good shape. The ear canal was normal, the membrana tympani entire, somewhat dull, the hearing good.

Dr. Knapp said that this case had given him great satisfaction. He has considered the affection one of perichondritic abscess induced, as in most cases, by purulent otitis media and furuncles. The bluish, lustrous swelling was the same as in the degenerative perichondritis, which runs such a protracted course and leaves so hideous a deformity. He is inclined to believe that this calamity was spared his little patient by the early exposure, cleansing, and sterilizing the whole diseased area.

*Discussion.*—Dr. LEDERMAN spoke of a case of perichondritis coming on after frost-bite. Considerable of the cartilage was found diseased. Incision was made on both sides and a strip of iodoform gauze was passed through the auricle. The case healed completely, without deformity.

Dr. W. H. HASKIN presented a case in which **iodoform poisoning** had complicated the healing of a mastoid wound. The patient, a child of four, had had two simple mastoid operations performed. During the after-treatment of the second one, meningeal symptoms were very well marked. The child recovered and later suffered from a reinfection of the mastoid, necessitating another operation. The mastoid process was curetted and granulations were removed from the middle ear. The subsequent course was

unusual, inasmuch as fever arose two weeks after the operation and persisted for a number of days without anything to account for it in the wound. The doctor was about to operate again, when, instead of iodoform gauze being used in the dressing, plain gauze was applied—with the result that on the following day temperature had fallen to normal.

Dr. LEDERMAN inquired whether the urine had been examined for iodine. Answer, "No."

Dr. HASKIN said that he had endeavored to ascertain whether the meningeal symptoms after the second operation could possibly have been explained by the susceptibility of the child to iodoform.

Dr. HARMON BROWN replied that he had had the child in charge and that plain gauze had been used.

The next case presented was a **natural exenteration** of the **middle-ear cavities**.

Dr. DUEL presented this patient for Dr. BERENS: A young woman who had suffered for ten years from otorrhœa. She had visited the Manhattan Hospital on account of the loss of hearing. On examination, a defect was found in the posterior bony wall, and the middle ear, attic, and antrum were perfectly exposed without any ossicles, just as if a perfect radical operation had been performed.

*Discussion.*—Dr. HASKIN had recently removed some granulations in a suppurating ear and had then found the outer wall of the attic defective, exposing the ossicles in position.

Dr. DENCH recollects two cases where nature had exposed the bodies of the ossicles and where the articulations were distinctly visible.

Dr. JOHN GUTMAN presented a patient who had been operated on for a large **epidural abscess** after acute otitis media.

At the beginning paracentesis did not relieve the symptoms. The headache, rigidity of head, and tenderness along the posterior mastoid margin, with a temperature of  $103^{\circ}$ , persisted. Operation was urged but refused by the relatives until the condition of the patient had become very much worse. At operation, the entire mastoid process was found disintegrated. A fistula led back to a large epidural collection, exposing the dura of the cerebellar fossa. This dura was covered with granulations, which were removed. The sinus could not be recognized, and it is supposed that it became obliterated by the purulent process. The girl made an uninterrupted recovery.

Dr. LEDERMAN presented a case of **microtia**.

A child two and one half years old, microcephalic and deformed head. Both auricles are rudimentary; there are no auditory canals. The child apparently hears. Dr. Lederman asked the opinion of the Section as to whether anything should be done for cosmetic purposes, and at what time, as in these patients the canal is usually absent and the middle ear is defective in its anatomical construction though the labyrinth may be intact.

**A brief consideration of the prognosis in chronic suppurative otitis**, based on the results of a year's treatment in such cases. By THOMAS J. HARRIS, M.D.

Dr. HARRIS placed the following questions:

1. What is the future as regards the cure of the patient suffering from chronic discharge of the ear?
2. What chances has he for the relief of his symptoms along conservative lines of treatment, and what risk is he running of sooner or later suffering from fatal complications?

Dr. Harris has examined the suppurative cases for a period of eighteen months, in the service of Dr. Phillips at the Manhattan Eye and Ear Hospital. These cases have all been recently re-examined. Of over 100 cases observed, 50 attended regularly. All minor operations, principally for adenoids, extraction of polypi, and granulation tissue were first performed. Then medicinal treatment was begun. The total number of cases treated was 66. Forty of these were discharged cured at the end of from one to six months, 15 greatly improved, 11 not improved. Of the 40 cases reported cured, 5 were cases of acute exacerbation and are not included. Of the 35, subsequent examination at the end of the year was made in 20, of which there were 2 cases of relapse. Of the 11 cases not improved, the radical operation had been advised and refused in 4. In 88% improvement or a cure was secured. The cured and improved cases were treated by various medicines, including hydrogen dioxide, formalin, boric acid with alcohol. A weak formalin solution, ten to twenty drops to a quart of hot water, has served well in the irrigating of the ears. The syringing was followed by instillation of hydrogen dioxide in full strength. The danger in the use of the latter remedy is not recognized by the writer. The treatment was concluded by thorough dry cleansing, which was repeated two or three times a day. In cases of slight secretion, the dry treatment was employed and the instillation of the

boric acid in alcohol drops. In the presence of a greater amount of granulation tissue, in addition to curetting, chromic acid and nitrate of silver were employed. The nose and throat were treated, and in children the general health was improved by tonics. The writer believes that this form of treatment should be persisted in for weeks or months, and that the usual time of two to three weeks is altogether too short. The average time of treatment for the cases which he reported was from two to three months. If after this time the discharge is not controlled the question of operation comes up.

The writer thinks that a conservative note should be struck in the present era of aural surgery, and that the protecting wall of nature is amply sufficient. He does not think that a slight otorrhœa without other symptoms is sufficient to demand it. The writer draws attention to the comparatively large percentage of patients whose hearing is impaired after the radical operation. He also cites two fatal cases occurring in the practice of aural surgeons during the past year. The complete cessation of the discharge is not always assured.

Facial paralysis is becoming alarmingly frequent; though it generally clears up, it is nevertheless very disagreeable and may occasionally be permanent. A lasting cure is not always obtained; a healed cavity may subsequently become reinfected. The importance of operation in presence of intracranial complications, of course, is not to be doubted by any one; at the same time, that chronic otorrhœa *per se* without other symptoms is an indication for a radical operation is open to question, and to regard every case of suppuration as "a slumbering volcano or a charge of dynamite," is extreme. The exceedingly small proportion of autopsies where death has been due to an intracranial otitic lesion makes this point clear. Again, it must not be forgotten that loss of hearing does not infrequently follow operation, as recent statistics have shown. Comparing the relative proportions of cures from ossiculectomy to those obtained by radical operation, the results of the two methods seem to be about the same, while the interference with hearing has been very much less in the former than in the latter procedure.

*Conclusions.*—1. Chronic otorrhœa in a large percentage of cases is amenable to suitable medicinal treatment.

2. In addition to proper attention to disease of a general character and to the naso-pharynx, peroxide of hydrogen, with or

without formalin solution, gives the best results, all minor operative procedures, of course, first being attended to when necessary.

3. The results of such treatment are in a good number of cases permanent.

4. The risk of an uncured otorrhœa with good drainage is relatively very small ( $\frac{1}{2}$  of  $\frac{1}{2}\%$  of fatalities).

5. Medicinal treatment failing, after a suitable interval of time, the danger of fatal complications in absence of all symptoms should be laid before the patient and the promise of relief by operation stated.

6. Where there is no good reason to the contrary, such as intracranial or mastoid complications, the intratympanic method by ossiculectomy should be preferred, because: its results as regards cure are equally good; the risk of loss of hearing is vastly less; the danger of unpleasant sequelæ, such as facial palsy, is avoided; the possibility of prolonged after-treatment is obviated.

7. The radical operation is not without risk of life.

8. Where ossiculectomy fails or mastoid or other symptoms exist pointing to extension of the disease into the bone, it then becomes the suitable and valuable method of relief.

9. The protecting and assisting power of nature is never to be lost sight of.

*Discussion.*—Dr. PHILLIPS thought it very difficult to define the exact time for operation in chronic otorrhœa—in other words, when the conservative treatment should be given up as useless. The radical operation is to be resorted to only as a final means.

Dr. HERMAN KNAPP thought that the constitutional side of the patient should not be lost sight of, and especially diabetes and tuberculosis.

Dr. HASKIN had looked over the statistics in the clinic of Dr. Clemens and Dr. Duel, and found that, out of 207 cases of chronic suppuration during the past three years, a partial Stacke was performed in 2, ossiculectomy in 2, and radical operation in 7. In the others, the treatment had been conservative, by various medical applications and use of the attic syringe. He had been able to re-examine a considerable number of these patients and had found that 111 were cured.

Dr. LEDERMAN thought that the indication for operation depended on the local conditions, and that we should be careful in removing granulations, as they are often nature's safeguard.

The methods which he employed were about the same as had been mentioned by the reader of the paper.

Dr. TOEPLITZ thought that one of the fatal results following radical operation, as mentioned in the paper, was probably his; and he wished to say that it was a very unfortunate occurrence and seemed to be due to an infection with erysipelas, which complicated the healing process, and it had given rise to a temporo-sphenoidal abscess and meningitis.

Dr. DUEL thought that the question of the preservation of the function was, of course, of great importance, but, at the same time, it did not enter into account when the patient's life was in danger, and he thought that the danger to the patient should be the first indication for operation.

Dr. MEIERHOF thought that the indication for the operation generally depended upon the conditions present—bone fistulae, a narrow canal, or, in short, those conditions that interfere with proper access by ordinary measures. He thought that the cause was also important, because we know that the caries resulting from scarlet fever is very much more extensive and obstinate to overcome by treatment than any other. He thought that the value of the paper would have been enhanced if the aural conditions had been stated by the reader.

A paper on **variations in the depth of the antrum**. By Dr. P. D. KERRISON (published in full on pp. 171-176 of this number).

*Discussion.*—Dr. TANSLEY said that we usually learn more by our mistakes than in any other way; he reported having followed Broca's directions. He proceeded through the square described by this author, and in a very short time directly encountered the lateral sinus.

Dr. ARNOLD KNAPP thought that the landmarks on the external surface of the mastoid were not so reliable as remembering that the antrum can always be encountered by proceeding at the junction of the superior and posterior wall of the canal in a line parallel to the canal. He also thought that the danger of injuring the facial nerve from the antrum was exaggerated; it was liable to become injured in cases of neoplasm of the mastoid, or in cases where, after the mastoid process has been completely removed, the operation is extended in endeavoring to expose the jugular bulb.

Dr. PHILLIPS believed that five eighths of an inch should be considered the depth of the antrum from the surface. He always in operating regards the linea temporalis an important landmark.

In one or two instances he had exposed the temporo-sphenoidal lobe below the central portion of this landmark, so that in teaching he had always recommended the operator to confine his original opening to a section below this line. He had lately been more inclined to rely upon the spine of Henle in opening the antrum, always keeping close to the posterior border of the spine, but the suprameatal triangle should not be ignored.

**Discussion of Dr. Kerrison's Paper.**—Dr. LEDERMAN said that the mastoid antrum is most frequently found in the area mentioned by the reader of the paper. In narrow mastoids we should anticipate meeting the lateral sinus farther anteriorly. Only recently he found the sinus resting almost against the posterior wall of the canal, occupying, as it were, the region of the mastoid cells. In this case the dura dipped below the superior wall of the canal, and both structures were diseased from a chronic suppurative process of the middle ear. In such patients serious complications arise quickly, and extend rapidly.

During a Schwartze-Stacke operation the antrum was hidden by the dura from above and the lateral sinus projected forward, so that the posterior wall of the canal had to be removed before the antrum could be reached without damaging these tissues.

The "probe" is an important guide in ascertaining the position of the antrum in mastoid operations.

Dr. DUEL thought that while an anatomical work of this kind was very important, for the purpose of clarifying literature of evident mistakes, the facts nevertheless would not prevent the inexperienced or careless operator from going wrong. In other words, that with a fixed depth in his mind an operator might in some instances stop short of the antrum; and, in others, go too far if he were going in the wrong direction. The important thing was that the operator should have an abiding faith in the presence of the antrum always in the same place, viz., beneath the angle made by lines drawn tangent to the superior and posterior portion in the circumference of the bony canal wall, and that he should go ahead in this direction, irrespective of how deep, until that cavity was encountered, that in this position he would seldom expose the sigmoid sinus in going in to the antrum, and that in the rare instance in which this might occur it would be necessary to approach the antrum by removal of the postero-superior portion of the bony canal wall after separating the cartilaginous canal.

MEETING OF APRIL 2, 1903.

I. Paper: **The symptomatology and diagnosis of the complications of chronic middle-ear suppuration.** By T. PASSMORE BERENS, M.D.

Dr. BERENS, after giving the definition of chronic purulent otitis and the pathological changes which usually occur, described the various modes of extension of the infection, which depend to a great extent on the anatomical conditions in the temporal bone. The complications which are the result of these extensions were treated in detail under the following headings: Extradural abscess, meningitis, sinus thrombosis, and brain abscess. The occurrence, symptoms, and course of each of these conditions were carefully described.

II. Paper: **The treatment of the complications of chronic middle-ear suppuration.** By JAMES F. MCKERNON, M.D.

Dr. MCKERNON took up the treatment of the conditions in the order of their frequency. Leaving out the technique, he briefly described the local treatment of the middle ear, laying due weight upon the importance of treating the nose and the nasopharynx in all chronic suppurative conditions of the middle ear.

The treatment of acute mastoiditis was given—both the medicinal and the operative. The Doctor warns against the use of cold or heat if the case is of several days' duration, and he believes in the value derived from a bacteriological examination of the pus. As regards operation, the mastoid tip should always be freed and removed. The first dressing is made painless by the use of a sterilized piece of rubber tissue with holes, which is inserted into the bony cavity and then filled with gauze.

In all cases of periosteal abscess, the mastoid process should be opened. In the writer's experience of thirty-one cases of subperiosteal abscess in children, pus was found in the mastoid in thirty. The treatment then described was of adenitis and pachymeningitis.

In sinus thrombosis, exploratory incision of the sinus with the scalpel is advised. Too much manipulation should not be practised to restore the flow of blood from the jugular bulb, lest septic particles be released into general circulation. It is best always to expose the lower end of the sinus as near the bulb

as possible, as there the trouble is more apt to be situated, rather than at the upper knee. This is possibly due to the proximity to the tympanic cavity, especially when an unusually large jugular bulb is present. If the sinus contains a disintegrated clot or pus, the internal jugular vein should be resected immediately. This step begins by ligating the vein at the clavicle, resecting the vein up to its commencement at the bulb, and ligating all the tributary branches. The wound is closed by continuous silk sutures and a rubber-tissue drain is inserted at the lower angle. After an operation of this kind the temperature may remain high for a few days, although the case is progressing satisfactorily, owing to the previous absorption of the septic poison into the system.

In discussing the treatment of brain abscess after incising the dura, the dural flaps can be held apart by silk sutures. The writer prefers the scalpel and the finger for exploring the brain. The cavity can be cleansed by gentle irrigation with a warm salt solution or gentle mopping. Drainage can be accomplished either by tubes or gauze wicks, the latter being preferred. The importance of looking for multiple abscess-cavities is mentioned.

Little or nothing is to be gained by surgical means in the treatment of meningitis. Large doses of iodide of potash can be given internally. In metastases of the intestine, large doses of bichloride of mercury should be given, with frequent flushing of the colon with a saline solution of warm boric acid. The writer has seen three metastases of the intestinal tract brought to a favorable issue under this method. As regards facial paralysis, the Doctor is inclined to think that it often results from the inflammation of the chorda-tympanic branch extending into the main trunk. In the treatment, the interrupted galvanic current has given the best results. Suturing the spinal-accessory nerve has not been satisfactory. The medical treatment of labyrinthal involvement is described and the usual methods of treatment advocated.

In conclusion, the author states that he believes the number of cases of chronic purulent disease, with their complications, will steadily grow less, as the acute otitis cases will be recognized more early and appropriate treatment instituted.

*Discussion:* Dr. ABBE spoke of the great importance of early operation. He said it had been very interesting to him to observe how in the last thirty years certain changes had taken place in the practice of surgery. One of these was the great diminution or

disappearance of erysipelas; another, the diminution of pyæmia. The pyæmia to which he refers is the one which formerly was seen following otitis and appendicitis. Otitis cases now being operated on early, pyæmic cases are rare. He thought, as regards appendicitis, that in the last five years a great change had taken place. At the same time, these pyæmic cases, though very grave, do unusually well. He thought that the jugular vein should be operated on first. Some cases of meningitis seem to get well, and it appears to him that the conditions are similar to those in other serous cavities, inasmuch as a certain amount of toxic absorption can be recovered from. He thought it very important to emphasize (especially for the general practitioner) that we should not wait for external mastoid symptoms, as these frequently do not appear at all, owing to the elongated condition of the bone. As regards closing the wound, he thought that that was against surgical teaching, and he was able to obtain as good a cosmetic result by approximating the granulating surfaces by strapping. At the same time, there was no risk of any infection.

Dr. LESZYNISKY thought a question of some interest was: When should the neurologist be called in to see an ear case? Surely not during the stage of coma. He was firmly of the belief that if the case were studied earlier, conjointly, by the neurologist and the otologist, the diagnosis could be furthered. Unquestionably, the intracranial complications are now comparatively rare, and their diagnosis is often very difficult. Small abscesses may not give any characteristic symptoms at all. Statistics are of no value at the bedside. The Doctor cited two cases which he had recently seen where a correct diagnosis had not been made. In the second, the brain was explored in various directions; no pus was found, and at autopsy a tumor of the pons was found present. He thought that the differential diagnosis between meningitis and abscess may be extremely difficult, because the latter was frequently complicated by the former. The slow pulse is characteristic of an abscess, though it may occur in meningitis. Rigidity of the neck is sometimes present in cerebellar lesions. Serous meningitis can often not be diagnosticated; if the case gets well, it is customary to speak of it as "serous meningitis." Lumbar puncture is of but little assistance, and this step is not without danger. The Doctor was decidedly against indiscriminate exploration of the brain as sometimes practised by otologists. In regard to facial paralysis,

he had seen no advantage from the use of the interrupted current; if in the second week there was an absence of Faradic irritability of muscle and nerve, he thought the question was an open one whether the power would be regained.

Dr. GRUENING wished to call attention to the anatomical formation of the temporal bone and its influence on the course of disease. He showed a specimen where the jugular bulb was unusually large and not only occupied the floor but encroached upon the medial wall of the tympanum. As dehiscences are not uncommon, a case of this kind could easily show signs of pyæmic infection. He also spoke of cases where certain cells in the mastoid become involved and remain diseased while the rest of the process gets well. He referred especially to the cells in the tip. He thought that the anatomical conditions were of much greater importance than the kind of bacilli found present.

Dr. WENDELL G. PHILLIPS thought that if the acute cases were properly treated the chronic cases would not occur. If the chronic suppuration is complicated by mastoiditis, an operation should be performed. He thought that knowledge gained from the bacteriological examination was a very serviceable clue to the proper treatment in acute cases. In conclusion, he wished to enter a very warm plea for early operation in acute mastoiditis. Temperature in adults is of very little diagnostic value. In his experience, meningitis was always fatal, and all operative measures were needless.

## REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

By DR. ARNOLD KNAPP, SECRETARY.

MEETING OF MARCH 24, 1903. DR. J. B. EMERSON, PRESIDENT,  
IN THE CHAIR.

### *Presentation of Patients.*

Dr. DUEL presented a case of **secondary operation**. The patient had been operated upon by Ballance, of London, eighteen months ago. The case was one of otorrhœa since childhood, and the usual procedure, as described by this author, was followed. Dr. Duel stated that Ballance now has changed his method of operating, and simply splits the canal without removing any of the cartilage in the plastic step of the operation. The patient came to the Manhattan Eye and Ear Hospital five months ago with recurrence of the otorrhœa. The canal was found considerably stenosed. After two months of conservative treatment it was decided to operate. After detaching the auricle, a soft mass, covered with a thick membrane, was encountered, which came from the middle cerebral fossa and was as large as the ball of the thumb. It could be pushed back; there was some necrosis of the cavity and the facial ridge had not been sufficiently levelled down. The cavity was thoroughly curetted and the skin flap was taken by dissecting off the skin from the anterior wall of the canal and the cavum conchæ. This was then thrown up so as to cover the protruding mass; the cartilage was thoroughly removed, the wound was covered at subsequent operations by skin grafts. Then the case was free from symptoms and now is healed except at one small point in the tympanum.

Dr. HARRIS presented some **drainage gauze tubes**, as devised by Dr. Jack of Boston. These tubes consisted of thin rubber finger-cots which come in a number of sizes. Their principal object is to relieve the pain of the first dressing. According to Dr. Jack, the mastoid incision is partially closed above and below, and this rubber tube is passed down to the depth of the wound and then filled with gauze, which remains in place for twenty-four hours.

*Voluntary Contributions.*

Dr. QUINLAN spoke of a case of **congenitally deformed auricle** upon which he had just performed an operation. The auricle was prolapsed. Darwinian tubercle was very well typified, the ear not only stuck out, but was pointed, and the deformity was unusually marked. A posterior incision was made, the skin was dissected from the auricle posteriorly, and this was pulled up and attached by deep tension and superficial sutures. The auricle is now close to the side of the head and the result is very satisfactory as far as it is possible at present to determine.

Dr. QUINLAN also spoke of a child five years of age upon whom he had performed a **double mastoid operation**. Four weeks ago the child was admitted to St. Vincent's Hospital. Temperature was high and septic symptoms were pronounced. No cause could be found, though there was some discharge from the ear; Shrapnell's membrane was bulging and the mastoid tip was somewhat tender. At operation the cortex was found apparently healthy, but the entire internal structure of both mastoid processes seemed to be completely disintegrated; the temperature came down completely in about three and a half days; there was some history of a grippé infection.

Dr. HARRIS wished to ask the opinion of the Society upon the significance of *tenderness* along the *posterior margin* of the *mastoid process*. He recently had a case of *otorrhœa* of three weeks' standing without fever. The posterior margin of the mastoid was unusually tender; there was only slight sensitiveness over the antrum. At operation the antrum was found containing very little disease; the tip was broken down, and a cell situated deep down on the internal table was found full of pus.

Dr. SHEPPARD regarded pain in this locality as a very important symptom, and he thought that it was certain evidence of pus.

Dr. DUEL had seen this symptom associated with tenderness in other parts of the mastoid process.

Dr. LEWIS remembered two cases of tenderness rather far back at the masto-occipital suture. In one case an epidural abscess was found back of the sinus with a perisinuous abscess. The process in the middle ear in the case healed.

Dr. CLEMENS inquired whether the situation of the sinus in Dr. Lewis's case was normal.—“Yes.”

Dr. QUINLAN asked whether the sinus in Dr. Harris's case was exposed. Dr. Harris said it was not exposed, as there were no symptoms pointing to its involvement.

Dr. WILSON spoke of a man aged thirty whom he had first seen in 1897. There was a bluish tumor at the junction of the *Mt* and the posterior wall of the canal, measuring 9 mm vertically, 6 mm laterally, and projecting 2 mm into canal. It was apparently solid, extended outward on the posterior wall of the auditory canal for 10 mm, and evidently contained liquid. The patient disappeared from view; he was seen again in 1899. It was incised and a molasses-like fluid evacuated. The patient was not seen again until a week ago. The outer, incised part of the growth had disappeared, but a smaller mass containing liquid was left at the junction of *Mt* and canal. On incision, the same character of contents was let out. The fluid was examined; it appeared to be degenerated blood. Dr. Wilson thought that it was a haematoma, though he could not explain the reason for its occurrence in such a situation.

Dr. EMERSON inquired whether the sac had any lining, and whether it had been explored.

Dr. WILSON replied that it did not have a distinct lining.

Dr. FRIEDENBERG spoke of profuse, **persistent otorrhœa as an indication for the mastoid operation.** He had just observed a case where the otorrhœa had persisted profusely for three weeks. There were no other symptoms. The mastoid was opened and granulation tissue and caries were found, but no pus. The case has done well.

Dr. LEWIS inquired what the condition was of the drum membrane.—“There was a perforation in the posterior lower quadrant; the drum remained red.”

Dr. DUEL inquired whether there was any sagging of the canal wall.—“No.”

Dr. SHEPPARD remembered a case where otorrhœa had existed

for four or five weeks without any other marked symptom, and at operation he was surprised at the unusual amount of caries encountered.

Dr. CLEMENS inquired whether in Dr. Friedenberg's case the mastoid pain had previously existed.—"It had existed in the beginning, but not at the present time." He thought that the pain in the mastoid process originated whenever the process extended to the periosteum or the meninges. Hence he thought that in a case of central disease the otorrhœa could persist without any pain in the mastoid process. He reported that the first case of this character which he had seen was very similar to the condition described by Dr. Sheppard. The outer layer of the mastoid was thin but healthy, while the entire interior was disorganized.

Dr. CLEMENS reported a case of double mastoiditis, where there were some mastoid tenderness and bulging drums, with profuse otorrhœa. After three weeks both mastoid processes were operated upon and were found completely destroyed.

Dr. SHEPPARD had observed a case of mastoiditis in a patient whom he had first treated for eczema of the canal.

Dr. FRIEDENBERG said that he had operated upon a patient according to the radical method for chronic otorrhœa two weeks ago. The facial spur showed no tendency to granulate. He desired the opinion of the Society as to the advisability of skin grafting.

Dr. DENCH said that he had been practising skin grafting frequently of late, and had been very well satisfied with his success after primary grafts. He said that Mr. Ballance was now also practising primary skin grafting, and that he made it a practice to remove his gauze packing on the third or fourth day, so as to remove the superficial layer of the graft. He thought that he thereby obtained healing more promptly. Dr. Dench seemed to think that the graft when applied directly to the bone took in most cases. As a dressing, he now employed pledges of cotton, which were removed in eight days.

Dr. LEWIS said that he also had been practising skin grafting of late, and had at first been very much disappointed in the apparent sloughing of the skin graft, but found that it was only the superficial surface which sloughed, and that the process of healing was uninterrupted and the duration was very much shortened.

Dr. LEWIS spoke of the propriety of **removing adenoids during acute otitis**, and reported the case of a child between two and three years of age who had suffered from otitis for five weeks.

There was a profuse discharge due to streptococcus and pneumococcus infection. The membrana tympani was bulging, notwithstanding that paracentesis had been made three times. The supero-posterior canal wall was bulging. There was no mastoid tenderness. Temperature was  $100.4^{\circ}$ . He wished to know the opinion of the Society as to whether, under these conditions, it would be proper to remove the adenoids now or wait, or whether it would not be better to open the mastoid cells.

*Discussion.*—Dr. QUINLAN said that the same question had been brought up some years ago at an otological meeting, and he thought it was a very important one. He remembered having seen three cases where the ear condition had been made worse by the removal of the adenoids, and the mastoiditis seemed to have been augmented. He thought it wiser to wait until the acute symptoms had subsided.

Dr. DUEL said that in his experience the early removal of adenoids had given him only good results, and that he was in the habit of removing the tonsils and adenoids when doing the paracentesis.

Dr. FRIEDENBERG reported a case of otitis of four weeks' standing with muco-purulent discharge. This would cease, and at the end of five or six days there would be a fresh onset. He purposed removing the adenoids and performing a large section of the drum membrane.

Dr. DUEL stated further, that in mastoiditis it was his practice to remove the adenoids and tonsils at the same time with the mastoid operation. He had seen only good results come of this practice.

Dr. GRUENING had recently seen a small boy with a temperature of  $103^{\circ}$ . The mastoid was involved and adenoids were present. He thought that ordinarily the adenoids could be removed at a later time, and not in the presence of fever or any threatening complication.

Dr. DENCH would not operate for the removal of adenoids while fever lasted.

Dr. TOEPLITZ had seen a child of three years with otorrhœa where the adenoids had been removed. Temperature rose to  $103^{\circ}$  and remained high for four days. It then came down and the otorrhœa ceased.

Dr. GRUENING did not think that the adenoids had anything to do with the mastoiditis.

Dr. QUINLAN thought that as the adenoids were known to be a source of many of the ear infections, it would be better to remove them in a large percentage of cases.

Dr. SHEPPARD removed the adenoids in a patient while there was an epidemic of grippe in the house. The patient contracted pneumonia and died. The operation had been held responsible for the fatal result, and he was against operating during complications.

Dr. FRIEDENBERG thought that a feature not to be forgotten was, that as loss of blood is badly borne by children, the adenoid operation should not be performed if the mastoid operation has been severe.

Dr. DENCH reported a case of **catalepsy occurring in otitic meningitis.** Two weeks ago he operated at the Infirmary for acute otitis with mastoid involvement. Paracentesis was performed; temperature relieved. Later the mastoid tip became very tender. At operation the antrum was found normal, the tip involved. A perforation was present inwards toward the digastric fossa and posteriorly into the cerebellar fossa, producing an epidural abscess. The sinus was exposed, found thrombosed; the internal jugular was resected. For six days the patient did well, then he became apathetic, with slow pulse, double optic neuritis, and catalepsy.

Dr. DENCH thought that he had to deal either with a cerebellar abscess or with meningitis. The cerebellum was exposed and the fourth ventricle was accidentally tapped. The patient before the last operation developed a very marked form of catalepsy. This was less marked after the intracranial pressure was relieved.

Dr. MCKERNON spoke of a woman of forty-one upon whom he had operated for chronic otorrhoea by the Stacke method. She did perfectly well for six days, and then suddenly developed a **double facial paralysis** and had difficulty in swallowing. The reaction with the electric battery was normal, and the Doctor thought the condition due to hysteria and gave a good prognosis. Paralysis on the right side cleared up after thirty-six hours, and on the left side after seventy hours.

REPORT ON THE PROGRESS OF OTOLOGY FOR  
THE THIRD AND FOURTH QUARTERS OF  
THE YEAR 1902.

BY DR. A. HARTMANN, BERLIN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY OF THE EAR.

152. **Alexander, C.** On the pathologic histology of the aural labyrinth, with special regard to the organ of Corti. *A. f. O.*, vol. lvi., p. 1.

152. The patient was a laborer, sixty-six years old. He died from carcinoma of the tongue. During the last two years he had become progressively deaf. The day before his death his hearing was found to be  $\frac{1}{60}$  and  $\frac{2}{60}$ . Microscopic examination revealed a normal external and middle ear and marked atrophy of the organ of Corti, mucoid degeneration of the spiral ligament, and atrophy of the spiral ganglion of the cochlear nerve—in short, an affection of the membranous cochlea and of the cochlear nerve, without involvement of the rest of the labyrinth, and with intact labyrinthine windows. Three stages of atrophy were determined in the organ of Corti: *first*, circumscribed disappearance of the sensory epithelium in normal surroundings; *second*, defect of the sensory epithelium, with associated increase of the supporting cells; *third*, complete atrophy of the bacillary papilla. In place of the atrophied sensory and supporting cells, there was squamous epithelium.

The etiology was supposed to be marked arterio-sclerosis and, possibly, a cancerous cachexia.

HAENEL.

PHYSIOLOGY OF THE EAR.

153. **Frey, H.** Experimental study on the transmission of sound in the skull. *Zeitschr. f. Psych. u. Phys. der Sinnesorgane*, vol. xxviii., p. 9.

154. **Meyers, C.** On the pitch of Galton whistles. *Journ. of Phys.*, vol. xxviii., p. 417.

155. **Hammerschlag, V.** The location of the reflex centre for the tensor tympani muscle. *A. f. O.*, vol. lvi., p. 157.

156. **Zimmermann, G.** On the mechanism of hearing. *Münch. med. Wochenschr.*, 1902, No. 50.

153. The question as to the way by which the sound waves reach the labyrinth is still quite unsettled; we know very little regarding the transmission of sound waves in bone. The author has endeavored to study this subject, and especially to investigate the sound conduction in bone. He puts the following questions:

(1) In what way is the sound transmitted in human bone, and what influence has the structure of the bony tissue on this process?

(2) How does the macerated bone compare with the flesh in this particular?

(3) How are the sound waves transmitted in the cranial bones? To what extent does this occur, and in what way?

(4) What differences are there in these phenomena in the macerated and in the fresh specimens?

The important part of the apparatus is the microphone. By the aid of this, in a series of investigations the kind of transmission was studied on a macerated and then on a fresh thigh bone. It was shown that the important factor for the transmitting ability in a bone depended upon its density and in the relative position of its bony parts. The compact bone, as a rule, transmits better than the spongy, with the exception of those bones where the spongiosa is of a firm density and where the compact portion has a very small diameter. This condition holds equally for the dry, macerated as for the fresh, moist bone.

The author then studied the transmission of sound in the head by means of a macerated skull and a fresh skull containing brain and all the soft parts. A tuning-fork was introduced in the auditory canal and adjusted to the promontory. The following results were obtained:

*First.*—The direction which sound waves take upon reaching the head depends principally upon the distribution of the bony substances, in regard to its density.

*Second.*—The sound waves emanating from the auditory canal of one side spread over the whole skull, especially to the symmetrical points of the other cranial half—in other words, to the opposite pyramid.

*Third.*—There exists, therefore, a transmission of sound from ear to ear by bone-conduction. This takes place only through the bony skull, without the sound-conducting chain coming into play.

*Fourth.*—These conditions are present in the macerated skull; they are not altered in the fresh skull, and can be regarded to hold true in the living head.

The end of this very interesting paper discusses theoretically binaural hearing and monaural conduction. The fact is brought out that, as the pyramids are the hardest bony masses, they are best able to receive the sound waves which strike the skull at any place, conducting them to the auditory organs and connecting the two.

DREYFUSS.

154. Experiments with Galton whistles modified by Hawksley. The author concludes as follows:

(1) In all varieties of Galton whistles the pitch varies with the amount of ear pressure employed. The variation is greatest in low pressure. (2) Increase of the air pressure occasionally produces a sudden lowering of the pitch. (3) There is a definite point in the upper auditory limit where a tone can only be heard at the moment when the air enters or leaves the whistle. These are the periods where the pressure is the lowest and sounds of the lowest number of vibrations are produced. (4) The whistle tone of 50,000 vibrations in the skull is not audible. The highest audible tone of the Hawksley-Galton whistle has 20,000 to 25,000 vibrations (young individuals).

DREYFUSS.

155. HAMMERSCHLAG determined in eight young cats, in whom he had divided the medulla oblongata at various levels, the location of the reflex centre for the tensor-tympani muscle, and has found the approximate boundary of the tensor tympani reflex region to be behind the corpora quadrigemina, and the distal limitation to be the peripheric end of the middle third of the fourth ventricle.

HAENEL.

156. In a meeting of naturalists ZIMMERMANN read a paper in which he endeavoured to meet the objections which have been made against his theory.

SCHEIBE.

## GENERAL.

## a.—REPORTS AND GENERAL COMMUNICATIONS.

157. Barth. The condition of the ear and of the upper respiratory passages in 275 recruits. *Deutsche militärztl. Zeitschr.*, 1902, ix. and x.

157. The hearing was examined in a corridor, thirty-six metres long, in which a whisper is normally heard throughout the entire length. 59 % of the recruits had normal hearing, 25 % heard the whisper in 30 to 35 m, and 9 % in 20 to 29 m. In the last two groups, traces of old middle-ear disease were present in the form of cloudiness, scars, and deposits of lime in the drum membrane, though these were also found present in normal-hearing soldiers. In the presence of a perforation the hearing was always (though sometimes only slightly) reduced. In 7 % the hearing was below 20 m, as the result of severe chronic changes. For military purposes, the functional examination is not sufficient, because, even in the presence of a hearing power of more than 4 m, diseased conditions may exist in the ear, which will require discharge or treatment. The author concludes upon the importance of the associated treatment of the nose and the naso-pharynx.

ZIMMERMANN.

*b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.*

158. **Stangenberg, E.** On the relation of diphtheria to ear diseases. *Nordiskt medicinskt Arkiv.*, vol. xxxv., Div. I, No. 1, p. 4.
159. **Jurgens, E.** On the sensibility of the drum membrane. *Monatsbl. f. Ohrenheilk.*, 1902, No. 12.
160. **Bylsma, R.** On four cases of Ménière's symptom-complex. *Monatsbl. f. Ohrenheilk.*, 1902, No. 2.
161. **Wassiljew.** On the action of detonations on the function of the ear. *Wojenno medicinski Shurnal*, Nov., 1902.
162. **Sonntag, A.** On the pathology and anatomy of the temporal bone. *Monatsbl. f. Ohrenheilk.*, 1902, No. 11.
163. **Jurgens, E.** On the roll of the lymphatic glands in the neighborhood of the ear. *Monatsbl. f. Ohrenheilk.*, 1902, No. 2.
164. **Kretschmann.** Diseases of the maxillary articulation as the cause of nervous otalgia. *Arch. f. Ohrenheilk.*, vol. lvi., p. 24.
165. **Schade.** Migration of a nail from the naso-pharynx into the middle ear. *Deutsche med. Wochenschr.*, No. 44, 1902.
166. **Buyx et Villers.** Case of multiple sarcoma of the meninges, with extension to the two petrous pyramids. *Jour. méd. de Bruxelles*, 1902, No. 31.
167. **Massier.** Cardiac reflex of aural region. *Ann. des mal. de l'oreille, du larynx*, 1902, No. 10.
168. **Brod, S.** A case of objective tinnitus. *Wratschebnaja Gaveta*, 1902, No. 46.
169. **Alt, T.** On the disturbance of musical hearing. *Monatsbl. f. Ohrenheilk.*, 1902, No. 6.

158. The author has examined, during a period of seven years,

about 1000 cases of diphtheria, and has found ear disease in 243 (24.3 %), in which the connection with diphtheria seemed clear. The ear complication was most frequent in the ages up to five years, and between five and ten years—44.85 % and 32.51 % of the cases examined; very much less frequent in the older, 5%–10 %. In 16 cases a neurosis was present with aural pain, without any objective reason. Aural tubal catarrh was present in 190 patients—binaural, usually. In 28 cases this passed into an exudative process. Tubal catarrh generally belongs to the early stage of diphtheria. The exudative middle-ear processes were present in 65 cases, including these 28. The inflammation is usually very mild and did not present any particular peculiarity. Paracentesis was made necessary in 8 cases. Spontaneous perforation took place in 20. These processes usually develop somewhat later in the course of the disease—second or third week. It seems probable that the disease was produced by transmission through the tube. The intensity of the diphtheritic process seems to stand in no constant relation to the occurrence of the ear disease. This may occur in very mild cases, or be present in very severe cases.

JØRGEN MØLLER.

159. This is the examination of healthy persons and others suffering from ear disease, by testing the sensibility of the drum membrane and of the meatal walls with the probe. The author frequently found a diminution of sensibility without any apparent cause. Hyperæsthesia is more uncommon in purulent otitis media; in more than one-half the cases the sensibility was diminished, while it was increased in the acute catarrhal processes.

BRÜHL.

160. The causes of diseases were : first, tubal occlusion; second, severe sneezing after cold; third, an attack of glaucoma; fourth, excessive smoking. Recovery took place after catheterization, with the use of a miotic in the third case, and in the fourth by injection of pilocarpin and massage.

PIFFL.

161. The examination of soldiers took place six or seven hours after cannonading ; 200 soldiers were examined who had stood next to the cannons during the shooting. Of these, 79 complained of various noises and stopping up of the ears. In many, a hyperæmia of the drum, of varying grades, up to the reddening of the entire membrane, was observed. Cloudiness of the drum membrane existed in a few. Hearing in many was reduced, more for high than for low tones. This disturbance of hear-

ing in all disappeared completely after three or four days. The shooting with smokeless powder seemed to have a more violent effect on the hearing than the ordinary powder, according to the testimony of the soldiers; there was no objective difference observed.

SACHER.

162. Three specimens are described. In the first two, a very marked defect in the jugular sulcus, with simultaneous high location of the jugular sulcus, so that the wall of the bulb was directly adjacent to the drum. In the third specimen there was bony ankylosis of the malleo-incudal articulation, with new bone-formation in the drum membrane and tympanic cavity. BRÜHL.

163. Owing to the close relation of the lymphatic channels of the ear to the surrounding lymphatic glands and the varied etiology of their affections, the author decided that these glands are never independently affected; that their cause is generally in a disease of the middle ear; that inflamed glands may simulate a mastoiditis.

PIFFL.

164. KRETSCHMANN found a disease of the maxillary joint to be the cause of nervous otalgia in 20 out of 84 cases. This was always monaural, and usually rheumatic in nature. It can be easily overlooked, owing to the preponderance of the aural pain. The location of the pain in the ear can be explained either by incorrect localization or by a reflex irritation of the tympanic plexus.

Prognosis is good. Treatment consists in immobilizing the joint, applications of iodine, ichthyol, salicylate. HAENEL.

165. A man nineteen years of age extracted a nail from a box with his teeth four years ago. He swallowed the nail, and suffered considerable pain in his throat for eight days. Attempts at extraction at that time did not succeed. Four years later, after a violent movement, sudden shooting pain set in in the left ear, and after three days the patient was able to extract out of the ear a nail 12 mm long, 1 mm thick, bent in the middle. In the following weeks, symptoms of severe otitis gradually disappeared.

NOLTENIUS.

166. A man, twenty-two years of age, grew completely deaf two years ago, with a number of other nervous disturbances: giddiness, headache, double-sided optic-nerve atrophy, paralysis of the left facial nerve, nystagmus, ptosis right, and diminution of intelligence. At autopsy three sarcomas were found at the base of the skull in the meninges. Two of these tumors had prolongations extending into the internal auditory meatus, which completely

occluded this passage and had destroyed the nerves and the surrounding bone. The cochlea was also affected by the tumor, but the vestibule, semicircular canals, and middle ear were intact.

RAU.

167. The disturbance consisted in cardiac palpitations which had existed for years in increasing frequency and which were not organic and could not be relieved by any treatment. The ears were examined, owing to the complaint of tinnitus. Inspissated cerumen was found present. After this was removed the cardiac disturbance disappeared gradually.

ZIMMERMANN.

168. A child eight years of age complained of a foreign object in the right ear. According to the relatives, this had been introduced three years previous. The patient was awakened at night by a pain and felt that something was moving in the ear. After lone week the pain ceased and a noise was heard in the ear. A physician examined the patient on the second day, but found no foreign object. The peculiar noise could be heard at some distance. It was of rhythmic character and recurred 132 times in the minute. It ceased on deep inspiration, when the mouth was kept open during Valsalva's experiment, and on air rarefaction in the external canal. When the patient was lying down, the sound was less noticeable, and not at all during sleep. Beyond retraction of the drum, no other anomaly. The author thought that the noise was caused by contractions of the tensor tympani muscle.

SACHER.

169. The disturbance of musical hearing produced by peripheric disease of the auditory organ, was the subject of this investigation. Seven additional cases are added to those found in literature. Experiments with tuning-forks were instituted after the production of an interference with the sound-conducting apparatus and after forcing inward of the drum membrane with the Siegle speculum. It was shown that of the various tuning-fork tones the deeper one could be made imperceptible by the increase of pressure, or that in the presence of heavy tones the fundamental tone would no longer be heard as soon as the increase in pressure took place.

As a result of these experiments, which the author regards as due to increased pressure within the labyrinth, a theory explaining various disturbances is formulated.

This very interesting paper should be read in the original.

PIFFL.

## C.—METHODS OF EXAMINATION AND TREATMENT.

170. **Gutzmann, H.** On hearing exercises with the phonograph. *M. f. O.*, 1902, No. 8.
171. **Marage.** Scientific treatment of deafness. *Arch. internat. de laryngol., d'otol. et de rhinol.*, Juillet-Aout, 1902.
172. **Bayer and Pennickx.** Static electricity in otology. *Journal médical de Bruxelles*, 1902, No. 39.
173. **Harris, Thos. J.** Prognosis of chronic catarrh of the ear. *Annals of Otology, Rhinology, and Laryngology*, August, 1902.
174. **Gomperz.** On improved hearing after suppurating otitis. *Arch. des mal. de l'or., du lar.*, 1902, No. 8.
175. **Bentzen.** On improving the hearing with the artificial ear-drum. *M. f. O.*, 1902, No. 1.
176. **Oaks, J. F.** On the use of hot air in Eustachian catheterization. *Laryngoscope*, Sept., 1902.
177. **Spiess, G.** Anæsthesin, the new, local anæsthetic, with remarks upon the routine action of anæsthesia. *Münch. med. Wochenschr.*, 1902, No. 39.
178. **Lehmann.** Adrenalin. *Münch. med. Wochenschr.*, 1902, No. 49.
179. **De Stella.** Report of the physical action and therapeutic use of adrenalin. *Bulletin de la société de médecine de Gand*, Sept., 1902.
180. **Taramasio.** Toxicology of adrenalin. *Revue médicale de la Suisse Romande*, 1902, No. 8.
181. **Escat.** Adrenalin in nasal surgery. *Arch. internat. de laryngol., d'otol. et de rhinol.*, Sept.-Oct., 1902.
182. **Schubiger-Hartmann.** Adrenalin. *Correspondenzblatt f. Schweizer Aerzte*, 1902, No. 21.
183. **Goldschmidt, A.** The use of adrenalin in the treatment of nose and throat. *M. f. O.*, 1902, No. 9.

170. The author recommends the phonograph for vocal training, to replace the hearing exercises, and especially in deaf-mute institutions. In one case, the patient was able to distinguish readily the vowels, by the hearing, with the aid of the phonograph. The author seems to regard the hearing exercises as of some value.

BRÜHL.

171. As massage of the drum may be injurious owing to the excessive excursion of the ossicular chain which it produces, the author has advised a vibratory apparatus, on the principle of the siren, which communicates to the stapes vibrations of the same character as those of an enunciated word. The fundamental vibration of the German vowels "u, a, o, e, i," serves at the same time to measure exactly the hearing power. The author has employed his apparatus in various forms of deafness, and the results which he accomplishes are truly remarkable.

RAU.

172. Treating the drum membrane with static electricity: Fifteen cases of deafness and partial tinnitus, usually produced by affections of the sound-conducting apparatus. An improvement in hearing and diminution of the noise were obtained. The accompanying case-histories do not, however, seem to be quite positive proofs of the author's statements. It seems that most of the affections were the subsequent conditions to chronic disturbances in the nose or naso-pharynx, where, as is well known, local treatment often produces a decided improvement of the symptoms. It is therefore not improbable that the improvement obtained was principally due to the preceding local treatment. RAU.

173. HARRIS believes that the progress achieved in the treatment of chronic catarrh of the ear has been small and our chief success rests in the ability to set aside the cause originating the nasal catarrh. Tubal therapeutics and pneumo-massage are at best only of temporary benefit and in the hands of some even harmful. Prophylactic measures are of greatest value, especially the early removal of adenoids. Naso-pharyngeal catarrh in every instance is capable of at least temporary cure by removal of some local cause, although the local cause may not turn out to be the real cause. Then we must look for it in some general dyscrasia, the removal of which is essential to success, although not possible in all instances. CLEMENS.

174. GOMPERZ speaks of the value of triacetic acid to close large perforations, and, in cases where this is unsuccessful, of the value of artificial drums. He has had good success with chemically pure silver and vaseline. In cases of adhesion between the malleus and promontory, these are to be released and to be kept separate by the introduction of celluloid strips.

ZIMMERMANN.

175. The author has examined seven ears with double defects of the drum membrane before and after the introduction of the artificial drum. The examination was with whisper, continuous-tone series, Galton whistle, Weber's and Schwabach's experiments. The results are as follows:

1. The hearing distance for whispering voice becomes greater.
2. The lower tone-limit descends.
3. The upper tone-limit remains.
4. The quantitative hearing power is increased.
5. The bone-conduction is usually enlarged.

Thus, it is seen that the artificial drum serves for the better comprehension of the conversational voice. The author has

observed, after a prolonged use of the artificial drum, a permanent improvement in hearing.

PIFFL.

176. The apparatus described consists of a brass tube, around which is woven a coil of wire of high resistance. A packing of asbestos surrounds the coil, which is further encased in a brass tube of small dimensions. The distal end is in form of a metal tip, and the proximal end is made of black fibre. The heat generated by the high resistance wire causes the inner brass tube to grow sufficiently hot to heat the compressed air in its passage through it. A metallic catheter covered by hard rubber is used with no uncomfortable sensation of heat or burning to the patient. The catheter is of ordinary size and being flexible it can be bent almost as freely as a silver one.

CLEMENS.

177. The difference in the action of cocaine and orthoform is discussed. That anæsthesin acts similarly to orthoform is, however, to be proved. It may be employed after operations to relieve pain, and it is supposed to favor the healing of the wound. It is of advantage in whooping-cough and acute coryza.

SCHEIBE.

178. After a prophylactic injection of 1 to 2 ccm of 1:1000 adrenalin solution in the livers of rabbits, small pieces of liver could be excised without hemorrhage. A marked hyperæmia set in after this without hemorrhage. There were no symptoms of intoxication. Thus far, no toxic action has been observed in man.

SCHEIBE.

179. The author reports on experiments with dogs and rabbits. After intravenous injection, the general action set in, even after  $\frac{1}{10}$  ccm of the 1:1000 solution: excitement, then paralysis of the vagus centres. After the other method of application, the local action was the principal one. For operations in the nose, the introduction of the tampon soaked in a mixture of adrenalin and cocaine is advised. He thinks that thus the dangers of cocaine intoxication are also diminished. For operations in the mouth, adrenalin is to be injected in the tissue. It is also of service in the mastoid operations. No severe after-hemorrhages have been observed.

RAU.

180. After numerous experiments on animals, the author finds that adrenalin in subcutaneous injections is fatal for rabbits in a dose of 0.02 gram per kilogram, in some cases 0.004 gram. Corresponding doses in the guinea-pig varied between 0.01 and

0.004 gram. Death resulted in less than one hour from acute œdema of the lungs, with dyspnœa, fall of temperature, diminution of sensibility of the reflex and the voluntary motion. In the frog, a dose of 0.5 gram per kilogram is always fatal. RAU.

181. ESCAT always employs a mixture of adrenalin and cocaine. He thinks this is contra-indicated in some diseases: in cases of adrenalin intoxication, syncope (cerebral anaemia). Careful packing after operation is indicated to prevent after-bleeding. RAU.

182. The authors have employed adrenalin in acute empyema after coryza. It was introduced on pledgets of cotton and relieved the symptoms. The removal of polypi from the middle ear is always aided by the previous use of adrenalin. RAU.

183. This author has tested the haemostatic action of adrenalin, and has found that it serves in acute epistaxis, as well as to prevent bleeding after operations. BRÜHL.

#### *d.—DEAF-MUTISM.*

184. Hammerschlag, Victor. A new subdivision of the various forms of deaf-mutism. *A. f. O.*, vol. lvi., p. 161.

184. The objections to the present classification are:

1. The previous subdivision into congenital and acquired is not grounded on pathological or clinical differences.
2. Pronounced congenital forms of deaf-mutism may appear under the clinical picture of acquired.
3. Acquired deaf-mutism may be acquired intrauterine.
4. Endemic deaf-mutism cannot be grouped in either of these subdivisions.

A new classification is suggested. The author differentiates between (1) the deaf-mutism caused by local disease of the ear, and (2) constitutional deaf-mutism. The former is always acquired, usually in post-foetal life; the latter, just as the constitutional anomaly of which it is the rudiment, may be acquired or congenital. In the second group, the endemic are separated from the sporadic forms. HAMMERSCHLAG thinks that pathological research will succeed in finding characteristic marks for each one of these new forms. The observations are based on the research of Bircher. New investigations not made. HAENEL.

#### **EXTERNAL EAR.**

185. Broeckaert, J. Endothelioma of the auricle. *La Presse otolaryngologique Belge*, No. 8, 1902.

186. **Pooley, Thomas R.** Epithelioma of the auricle and auditory canal. *N. Y. Med. Jour.*, July 26, 1902.
187. **Jürgens, E.** Three cases of congenital auricular atresia with microtia. *Monats. f. Ohrenheilk.*, 1902, No. 7.
188. **Lamann, W.** On pressure packing in furuncular otitis externa. *Monats. f. Ohrenheilk.*, 1902, No. 6.
189. **Wissiljew.** Circumscribed external otitis. *Wojenno medicinski Shurnal*, Sept., 1902.
190. **Ruprecht, M.** External croupous otitis caused by bacillus pyocyanus. *Monats. f. Ohrenheilk.*, 1902, No. 12.
191. **Ostino, E.** Ulcerous tuberculosis of the external auditory canal.
192. **Bogoslawski, D.** On foreign objects in the upper ear-passages and in the nose. *Wratschebnaja Gasea*, 1902, No. 42.
193. **Prota, N.** Bilateral epidemic parotitis with suppuration and perforation into the external auditory canal. Meningitis. Death. *Arch. ital. di otol.*, vol. xiv.
194. **Treitel.** Two cases of scalding of the ear. *Deutsche med. Wochenschr.*, No. 32, 1902.

185. Tumors starting from the vascular endothelium are very rare in the auricle.

A farmer, fifty-six years old, had had a small wart at the base of the right lobule since youth. The tumor had grown for two years. It is painless, though unpleasant on account of ulcerating. It is the size of a large strawberry, involves the entire lobule; the canal is free, and the function of the ear is normal. The tumor is removed: recovery. The growth shows an alveolar structure, and is composed of granular tissue with many leucocytes. The disposition of the epithelioid collection of cells, in round or oval alveoli or irregular compartments, suggests an alveolar or a plexiform sarcoma. With the high power the cells seem to be endothelial and not epithelial. The hyperplastic endothelial cells have caused a dilatation of the lymphatic spaces and capillaries, thus producing the alveolar structure of the tumor. The tumor belongs to the group of angio-sarcoma and is designated by the author as an interlymphatic endothelioma. **BRANDT.**

186. The patient, male, aged fifty-eight, some five years before seeing the writer, found a nodule on the auricle which subsequently broke down into an ulcer. The growth was situated in the upper part of the helix just about the region of the antihelix, and from the lower part of which extended whitish reticular tissue involving the concha, tragus, antitragus, and auditory canal. The growth was half an inch in length by three quarters of an inch in width. The case was operated upon and all suspicious tissue

carefully removed. Healing and complete cicatrization followed in about five weeks. About the end of a year there was a recurrence of the disease, which was promptly removed as before. Symptoms of erysipelas developed the following day which in no way interfered with the favorable granulating process of the wound. The case was discharged one week after the operation.

CLEMENS.

187. Examination with the continuous-tone scale gave, in the first case, complete deafness on the deformed ear. In the second case, the organ-tones from  $a^2-f^5$  are distinctly heard; the tones  $h-a^2$  very indistinct; speech is heard by the right ear, after carefully closing the left (with a moistened finger), somewhat imperfectly and only with a very loud voice. In the third case, a child of three months, the hearing appears to be present. BRÜHL.

188. The author defends the treatment of furuncles of the external auditory canal with the pressure packing which he described in *Monats. f. Ohrenheilk.*, 1899, No. 2, against the unfavorable criticism of Grosskopf in his monograph "Inflammations of the External Auditory Canal" (*Haug's klin. Vorträge*, vol. iv., No. 6). PIFFL.

189. The best results, according to the author, are furnished by instillations of 95 per cent. alcohol with 4 per cent. boric acid and 2 per cent. cocaine in the presence of very severe pain. After the instillation the ear is occluded with cotton; the pain rapidly diminishes. SACHER.

190. A croupous otitis. Dressing was stained light blue. Bacteriological examination: bacillus pyocyanus was cultivated in pure culture. BRÜHL.

191. A patient, twenty-seven years old, with hereditary tuberculosis. A polyp was removed from the outer canal and a round ulceration was found at the posterior and superior bony canal wall. It healed, and shortly after another ulcer formed in the cartilaginous canal. The pus contained tubercle bacilli. RIMINI.

192. Of 3332 patients there were 72 cases of foreign bodies, of which 52 occurred in the ear, 11 in the nose, 6 in the mouth, 1 in the pharynx, and 2 in the larynx. A case of a fly in the vallecula and a case of complete aphonia produced by inspissated cerumen are interesting. After removing the cerumen the aphonia disappeared. SACHER.

193. A little girl, two and a half years old, was taken ill with a double-sided epidemic parotitis, with the development of an abscess which perforated into the external canal. After an extensive incision and removal of the necrotic glandular tissue, fever and pain disappeared. Four days later temperature rose suddenly and death ensued from meningitis. According to the author, this case is remarkable, in addition to the rare termination of epidemic parotitis in the formation of an abscess, in involvement of the meninges, which must have resulted metastatically, as the middle ear and labyrinth were intact.

RIMINI.

194. The author cites the cases of Bezold, Mariani, and Schäfer, and reports on two personal observations of destruction of the drum—in one case from steam, the other by fluid iron. In the latter case, the drum was not directly injured by the melted metal, as no iron was found in the canal, but through the production of steam. The characteristic condition is the unusually decided loss of hearing at the beginning. In most cases a whisper can only be heard near the ear. The simultaneous affection of the labyrinth is probably produced by hyperæmia following the great heat, and thus the permanent damage to the hearing followed hemorrhages which had taken place in the labyrinth.

NOLTENIUS.

#### MIDDLE EAR.

##### a.—ACUTE OTITIS MEDIA.

195. Schilling, R. On the presence of the pseudodiphtheria bacillus in acute otitis media. *Monatsbl. f. Ohrenheilk.*, 1902, No. 10.

196. Ferreri, Gherardo. On purulent otitis media in ozæna. *Archivio Ital. di otol.*, vol. xiii., No. 3.

197. Schröder, W. Two cases of severe acute otitis media after taking snuff. *Münch. med. Wochenschr.*, 1902, No. 47.

198. Kühnlein, J. On the etiology of acute otitis media. *Monatsbl. f. Ohrenheilk.*, 1902, No. 11.

199. Sendziak, S. On the favorable action of erysipelas upon the course of severe, acute purulent otitis. *Monatsbl. f. Ohrenheilk.*, 1901, No. 12.

200. Halsted, T. H. The early diagnosis and treatment of acute mastoid inflammation. *Philadelphia Medical Journal*, Aug. 2, 1902.

201. Cheval, V. A case of Bezold's mastoiditis. *La presse otolaryngologique Belge*, 1902, No. 10.

202. Moure. Treatment of acute purulent otitis. *Ann. des mal. de l'or., du lar., etc.*, 1902, No. 7.

203. Mahu. Combined prolapse of the sinus and of the dura mater, making a mastoid trephining impossible. *Ann. des mal. de l'or., du lar., etc.*, 1902, 10.

195. The bacteriological examination of fibrinous membranes which were cast off and freshly formed during the acute otitis media, showed the presence of pseudodiphtheria bacillus, which can produce diphtheritic membranes as well as the true diphtheria bacillus.

BRÜHL.

196. The author attempts to show that a particular form of purulent otitis media can be produced by ozæna, characterized by an obstinate course and uncontrolled by treatment. In seven of these cases the bacillus mucosus ozænæ was found present.

RIMINI.

197. The middle-ear disease followed the taking of snuff in four and in three weeks, respectively. In the second case, both ears were diseased, though perforation took place only in one.

SCHEIBE.

198. In support of his view that bathing is of little influence in producing acute otitis, the author has examined the histories of the patients in Gerber's Dispensary, and has come to the well-known conclusion that this disease occurs most frequently in winter and in spring and most rarely in the summer.

PIFFL.

199. The author reports a case of acute otitis in a man fifty years old, with tenderness of the mastoid process, which, after existing for five weeks, healed during the course of facial erysipelas.

PIFFL.

200. HALSTED believes that in every case of suppuration of the middle ear the mastoid is involved. Thirty children, dying from various complications of measles, were autopsied with special reference to their ears, and every single case showed pus in the mastoid, while during life in the majority of the cases the ears were not thought to be involved and many were not even examined.

CLEMENS.

201. A case of this character is described, which recovered after three operations. The author is inclined to operate early, to prevent cerebral complications and to preserve a better function of the ear.

BRANDT.

202. The author agrees with Zaufal that, even in the presence of suppuration in the tympanum, a paracentesis is not absolutely indicated; the naso-pharynx should be carefully treated, carbolic-acid glycerine instilled, and revulsive measures should be adopted. If the fever and pain persist, paracentesis should be

done in the anterior and lower quadrant. After operation, irrigation with hot boric-acid solution should be repeated several times each day, and the ear should be bandaged. Ear inflation and irrigation from the tube are contra-indicated.

ZIMMERMANN.

203. In operating upon a mastoiditis after acute otitis and beginning at the typical location underneath the linea temporalis,  $\frac{1}{2}$  cm behind the meatus, the sinus and dura were exposed within  $\frac{1}{2}$  cm. Eighty-six temporal bones were examined and one analogous case found.

ZIMMERMANN.

*b.—CHRONIC PURULENT OTITIS.*

204. **Geronzi.** Formalin in the treatment of chronic otorrhœa. *Archivio ital. di otol.*, vol. xiv., No. 1.

205. **Ehrenfried.** A particular method of treating chronic otorrhœa, with a list of the medical agents employed. *Deutsche med. Wochenschr.*, No. 52, 1902.

206. **Dench, E. B.** Various operative procedures for the relief of chronic suppurative otitis media, and their comparative value. *American Journal of Medical Sciences*, Nov., 1902.

207. **Jaumenne.** The radical cure of otorrhœa in Jansen's clinic in Berlin. *La presse otolaryngologique Belge*, 1902, No. 10.

208. **Frey, Hugo.** The closure of the retro-auricular opening by subcutaneous injection of paraffin. *Arch. f. Ohrenheilk.*, vol. lvi., p. 289.

209. **Buhe, E.** The influence of the radical operation on the hearing. *Arch. f. Ohrenheilk.*, vol. lvi., p. 223.

210. **Citelli, S.** Stapedectomy in a patient suffering from chronic purulent otitis. *Archivio ital. di otol.*, vol. xiv., No. 1.

211. **Resser, M.** On cholesteatoma of the middle ear. *Medicinskoje Obosrenje*, 1902, No. 8.

212. **Reinhard, P.** A case of chronic otorrhœa complicated by fracture of the base of the skull. *Monatsbl. f. Ohrenheilk.*, 1901, No. 9.

204. The action of formalin in 55 cases of chronic otorrhœa is described. To relieve its irritating action, a solution in glycerine was used—2 %, 5 %, up to 10 %. In a very short time after its use the fetor disappeared, and the granulations in the middle ear seemed to be very favorably acted upon. In the author's experience a 5 % solution of formalin in glycerine, with the addition of a 5 % solution of sodium carbonate, is best borne by the patient.

RIMINI.

205. This method consists of instilling dissolving fluids in the ear and through the perforated drum into the middle ear and accessory cavities. Then, with a pipet inserted air-tight in the

canal, aspirating and pressure movements are performed to facilitate the removal of the dissolved masses of pus. The treatment is more efficacious if the pipet is connected with a small pump, or with the water pipes so that a continuous suction is obtained.

NOLTENIUS

206. This paper deals with those cases in which the suppuration is of long standing and has not yielded to the ordinary measures usually employed for its relief. DENCH believes that no matter how virulent the primary affection is, if the case is seen early in the acute stage serious intratympanic caries can be prevented; the only exception he makes to this general rule being early involvement of the mastoid cells, following acute inflammation within the ear and tubercular infection of the intratympanic structures.

The various operative methods employed for the cure of chronic suppuration are presented in detail; the writer's experience and that of others for these operations being reviewed thoroughly. A choice of any particular method must depend upon the extent to which the bony structures are involved. While in former years the writer depended upon simple operative measures, later experience has led him to believe that conservative surgery in this region is a mistake. Accepting that the simple operation of ossiculectomy is indicated in a certain proportion of cases, it will become more and more restricted as the experience of the surgeon becomes wider. In speaking of accidents during the course of a radical operation, wounding the facial nerve can always be avoided if the rule of removal of the posterior wall of the canal until the horizontal semicircular canal is seen, be uniformly followed. As to the results of the radical operation on the function of audition, Dench says: "The surgeon is not warranted in promising the patient that the hearing will be as good after the operation as it was before, unless at the time of the operation the power of audition is greatly diminished in the affected ear." However, the question is not so much the preservation or improvement of audition as the removal of a serious menace to life.

CLEMENS.

207. The indications for the radical operation, and the method of operating, as practised at Jansen's clinic, are described.

BRANDT.

208. The author recommends subcutaneous injection of paraffin to close the retro-auricular openings in those cases where the

opening is not larger than  $1\frac{1}{2}$  cm in diameter and the margins of the opening are not formed by dense scar tissue but by movable skin. Usually two or three injections are necessary; the reaction is very slight—a slight rise of cutaneous temperature, sometimes a slight redness of the skin, a sense of swelling for two or three days, without pain. Seven cases are reported with fourteen illustrations. In one case the edges, which had become approximated by the injection, were freshened, and union occurred without suture.

HAENEL.

209. The subject of these investigations was 112 cases which had been operated on in the ear clinic at Halle since April, 1894. Only those cases were taken where, at the time of examination of hearing, the healing was complete and remained so. The examination consisted of the use of the whisper, with c<sup>1</sup> and F sharp <sup>4</sup> tuning-forks. Thirty-four per cent. were improved, 36 % stationary, and in 30 % there was a deterioration of hearing. In comparison with other statistics, those of Trautmann furnish about the same result, while all the others are more favorable. The following conclusions are obtained:

The hearing results after operation, which have been published, are unreliable and cannot be compared, because up to the present time there is no uniform method of examination in practice. The general opinion on the influence of the radical operation on the hearing is much too favorable a one, and does not seem to be correct.

1. An improvement of hearing, or stationary hearing, follows radical operation generally in the cases in which the labyrinth or labyrinthal walls are intact and the hearing for whisper is under 1 metre.

2. An improvement always takes place when obstruction of the canal is present before the operation.

3. An improvement in hearing, or stationary hearing, is to be expected if the labyrinth and labyrinthal walls are diseased, or if only a very slight remnant of hearing is present before the operation.

4. Diminished hearing occurs in almost all patients who hear in one metre or more, before the operation, even if the labyrinth is healthy and remains so.

5. Deterioration of hearing occurs when the labyrinth and labyrinthal walls are diseased and the hearing power for whisper is between .25 m and below 1 m.

HAENEL.

210. A patient, twenty years of age, suffering from bilateral chronic purulent otitis where the drum was totally absent, and the stapes in the right ear, situated upon the promontory. It was removed with a small pair of forceps; five hours later, H. was marvellously improved. The whisper was increased by more than 1 m, and the perception of the lower tones was almost normal. After three months, the old condition of the hearing returned, together with subjective noises, presumably due to the contraction of the scar in the oval window. It is interesting to know that in the absence of the stapes, with intact oval window, the perception of the lower tones is good.

RIMINI.

211. The author describes two cases which are treated operatively: One in a farmer, seventeen years old, was a true cholesteatoma, which began, presumably, in earliest childhood; in its growth it had destroyed the tympanic cavity completely. There was no history of long-continued suppuration. In the second case, cholesteatoma occurred after middle-ear suppuration.

SACHER.

212. A child with chronic otorrhœa suffered from fracture of the skull with cerebral concussion; there were well-marked cerebral symptoms, high fever, and a swelling over the mastoid process. At operation extensive caries and a multiple fracture of the temporal bone were found. The operation had to be interrupted on account of collapse of the patient. It was completed after nine weeks, terminating in recovery.

PIFFL.

## C.—CEREBRAL COMPLICATIONS.

213. Schmiegelow, C. Contributions from the Otolaryngologic Department of St. Joseph's Hospital for the year 1901. *Ungeschrift for Laeger*, Nos. 33 and 34, 1902.

214. Panse, Rudolf. Clinical and pathological communications. *A. f. O.*, vol. lvi., p. 275.

215. Delsaux, V. Contribution to the study of the intracranial otitic complications. *La presse otolaryngologique Belge*, 1902, No. 7.

216. Gillot, V. Otitic cerebellar abscess. *La presse otolaryngologique Belge*, 1902, No. 9.

217. Laurens. Cranial resection for osteomyelitis of the squamous portion of the temporal bone of otitic origin. *Ann. des mal. de l'or., du lar., etc.*, 1902, No. 7.

218. Jurgens, E. Two cases of rupture of the internal carotid artery in disease of the middle ear. *M. f. O.*, 1902, No. 1.

219. Capart, A. Bezold's mastoiditis; operation; purulent meningitis; autopsy. *La presse otolaryngologique*, 1902, No. 7.

220. **Grivot.** Chronic otitis and cholesteatoma, facial paralysis, Bezold's mastoiditis, abscess of the neck and occipital osteitis; death from meningitis. *Ann. des mal. de l'or., du lar., etc.*, 1902, No. 7.

221. **Schmiegelow, E.** Otitic pyæmia. *Nordiskt medicinskt Arkiv.*, vol. i., Nos. 2 and 3, 1902.

222. **Koch.** A case of sinus thrombosis with otitic pyæmia healed by operation. *Ungeskrift for Laeger*, No. 49, p. 1153, and No. 50, p. 1197, 1902.

223. **Lannois.** Thrombophlebitis of the lateral sinus. Société médicale des hôpitaux de Lyon. Seance du 3 Oct., 1902. *Lyon médical*, 1902, No. 41.

224. **Lederman, M. D.** Thrombosis of the lateral sinus and internal jugular vein, with re-infection of the sinus after ligation of the vein. *Laryngoscope*, Nov., 1902.

225. **Hennicke.** A case of otitis media, sinus thrombosis, and double cerebellar abscess. *M. f. O.*, 1902, No. 9.

226. **Streit, Hermann.** Additional cases of endocranial complications of acute and chronic middle-ear disease. *A. f. O.*, vol. lvi., p. 178.

227. **Fedortschenko, M.** Two cases of otitic pyæmia. *Wojenno medicsinski Shurnal*, 1902, Nov.

228. **Leutert, E.** Reply to Körner's critical remarks on my paper on otitic pyæmia. *A. f. O.*, vol. lvi., p. 215.

213. The author reports on six cases of middle-ear suppuration with fatal termination. In all cases, operation was performed. The mastoid process was usually opened and the radical operation performed. The first two cases were acute suppurations with mastoiditis, in diabetic patients. In one case, death resulted from acute purulent meningitis, which probably resulted by direct extension through a necrosing osteitis. In the other case, on the third day after operation, diabetic coma set in with fatal termination after two days. The two following cases were chronic suppuration with extensive caries. After operation, the patients died from meningitis. In both, the sinus and the superficial area of the temporal bone were healthy. In one, a labyrinthine suppuration existed, and the pus reached the meninges along the eighth nerve. In five cases, cerebral symptoms were absent at the time of operation and the patient died a few hours later. Autopsy showed a tubercular meningitis and caries of the temporal bone, with perforation through the tympanum. The sixth case was very instructive: a chronic suppuration was present, with vertigo and vomiting. The radical operation was performed; the dura was exposed and found healthy. After a few days, pain, rise of temperature, slight rigidity of neck, and drowsiness set in; the sigmoid sinus was exposed; the brain was punctured in various directions, with negative result; the condition was somewhat variable, with a

jumping temperature; rather rapid emaciation. After five weeks, an abscess developed in the left palatal arch; the cerebellum was exposed and punctured, but nothing found. The patient died after a few days. In the dura, at the internal porus acusticus, the perforation was found, and an abscess as large as a walnut in the adjoining part of the cerebellum.

MOLLER.

214. The author reports on the microscopic examination of the temporal bone, gained from five oases of fatal labyrinthal suppuration. The report of the brain autopsy, and the case history of two patients who were observed clinically, are added; there are fourteen illustrations.

(1) Influenzal suppuration; perforation through both windows into the labyrinth; transmission along the water channels and the auditory nerve to the interior of the skull; destruction of all the nerve terminals in the labyrinth (corresponding to the hearing tests) and diffuse meningitis.

(2) Perforation of the pus through the oval window; purulent disintegration of the entire labyrinth, with the aqueducts; purulent inflammation in the internal auditory canal. Notwithstanding the threatening infection of the meninges, death resulted from a cerebellar abscess consequent to antral disease.

(3) Perforation through both windows into the labyrinth; extension by both aqueducts and the acoustic nerve to the meninges.

(4) Entrance of pus through the oval window; extension along the aqueducts and auditory nerve to the meninges, from here to the auditory-nerve of the opposite side and to the cochlea of the other ear.

(5) Entrance of suppuration through the oval window, destroying the membranous structures in the labyrinth; the cavities filled with newly formed connective tissue. Notwithstanding this tendency to heal, infection of the meninges.

HAENEL.

215. A patient with left-sided otorrhœa complained of severe pain in the forehead and temporal region of the right side. On account of high fever, left facial paralysis, sagging of the membranous wall, and fetid suppuration. The roof of the left middle ear, of the aditus, and of the antrum were removed and a brain abscess was evacuated. After five days, fresh fever, with rigidity of neck. Collapse. The author explored the left cerebellar fossa, without finding the anticipated second abscess. Death. The case is unusual on account of pain being localized in the opposite side. The high sounds were normal, notwithstanding the

symptoms of increased intracranial pressure. The pus extended to the cranial cavity, without involving the antrum. Autopsy showed a very extensive amount of disease before death ensued.

BRANDT.

216. A patient, twenty-three years old, had been ill for several days and had never complained of his ears. There was no otorrhœa, and the mastoid process was not tender. On account of these symptoms, a tumor of syphilitic nature was suspected. Death ensued after fourteen days' treatment. An abscess as large as a nut was found in the right half of the cerebellum, with a smaller adjacent one. In the right temporal bone there was a small, carious focus, together with mastoiditis. BRANDT.

217. In the case of a small girl, the entire mastoid process was found disintegrated and filled with fetid pus. There was an extradural abscess over the tegmen, and the squama was removed externally in the neighborhood of the parietal suture. It was then found that the diploë was infiltrated with pus. Two weeks after, on account of profuse suppuration, the entire necrosed squama was removed; the suppuration ceased and ossification soon set in from the periosteum throughout the entire defect.

ZIMMERMANN.

218. The author reports on two similar cases of carotid hemorrhage in recruits, occurring during an acute exacerbation of a chronic purulent otitis. Hemorrhage occurred after cauterization of the ear; it was arrested by packing, but always started up again. Death occurred in both cases from meningitis and sepsis. Autopsy revealed extensive destruction of the arterial walls. The author is in favor, in these cases, of packing after radical operation. In his opinion, ligation of the carotids is without avail. PIFFL.

219. The patient suffered from right-sided otorrhœa, with mastoiditis, after grippe. At operation fistulous tracts were exposed, leading down and back to the occiput. The carious bone was removed. At the second operation, the presupposed brain abscess was not found either in the temporal lobe or in the cerebellum. Death. The meninges were infiltrated with pus, especially over the frontal lobes. The left half of the base of the cerebellum was likewise affected, while the right half was normal. There was no brain abscess. The case is supposed to be an example of crossed brain lesion; inflammation of the meninges of the left side of the cerebellum in disease of the right mastoid process.

BRANDT.

220. The case is described in the title, though it is reported with all detail.

ZIMMERMANN.

221. A report of five cases of otitic pyæmia, which were cured by the radical operation. In the first four cases, no evidence of disease of the sigmoid sinus was present, while in the fifth a sinus thrombosis existed. In the first two, there were no metastases and only general septic symptoms. In the three, there was a superficial infarction and a septic empyema. At operation a large cavity was found filled with cholesteatoma, which had perforated into the middle cranial fossa. In four cases, a sub-perosteal abscess was present which had partly perforated towards the meatus and was also in connection with the fistula, with the posterior cerebellar fossa; not, however, with the bone abscess in the mastoid process. A large epidural abscess was found in the posterior cranial fossa, which communicated by a defect in the dura with the cerebellar abscess. Later, a retropharyngeal abscess developed by gravitation. The pus was liberated by an incision in the pharynx and by perforating into the auditory canal. A pulmonary abscess set in later. In the fifth case, at operation, a purulent, disintegrated sinus thrombosis was present. The sinus was opened, cleansed, and the jugular vein ligated. Notwithstanding, an abscess occurred in the left elbow and in the lungs, though the infection in the elbow was present before operation. The pathogenesis and symptoms of otitic pyæmia are thoroughly discussed. The author is of the opinion that an otitic pyæmia exists without sinus thrombosis, but that the osteophlebitis theory of Körner has not been proved; he thinks that pyæmia, where no sinus disease is present, is caused by direct absorption of septic products from the middle-ear cavities. As to the treatment: in acute cases, a simple mastoid operation, with incision of the drum, is sufficient, while in the chronic suppurations the radical operation is indicated. It is always of great importance to determine the condition of the sinus. Inspection and palpation are sufficient, as an obturating thrombosis is easily recognized, and a parietal thrombosis cannot be diagnosticated, even on opening the sinus, on account of hemorrhage. If septic thrombosis is present, the sinus must be broadly opened and evacuated, and then the jugular vein must be ligated.

A double ligature should be applied, and the vein divided between the two. The paper concludes with a report of all the operative cases of otitic pyæmia occurring in Scandinavian literature.

MOLLER.

222. The patient was a girl of twelve, who had suffered from double-sided purulent otitis after scarlet-fever in early childhood. During the past three weeks she had suffered from intermittent fever, rigors, vertigo, and vomiting. The right ear discharged freely and the tip of the mastoid process was swollen and tender. The tenderness extended on the sterno-mastoid muscle, without distinct infiltration. On the day following admission, a copious hemorrhage occurred from the right ear. The radical operation was performed and a perisinuous abscess evacuated. The wall of the sigmoid sinus was perforated and the sinus filled with a disintegrated, purulent thrombus. Five days later, a gravitation abscess under the upper half of the sterno-mastoid muscle was incised. The symptoms of pulmonary abscess and septic empyema led to a resection of the ribs. The patient recovered after three and a half months. A few remarks are added on the origin of sinus thrombosis and of otitic pyæmia, as well as on symptoms and treatment of this disease.

MOLLER.

223. Otorrhœa in a child, with symptoms of mastoiditis. At the first operation a healthy mastoid process was encountered; after a few days, symptoms of phlebitis of the internal jugular vein set in. The thrombosed section of this vein was extirpated. Death. At autopsy, numerous small abscesses were found in the lung, and thrombosis of the transverse sinus. A manifest communication between the sinus and antrum or tympanum did not exist; a change in the bone in this neighborhood was also absent. According to the author, infection occurred along the small diploic veins. We cannot understand why the transverse sinus was not exposed and cleansed when the jugular vein was resected. RAU.

224. Patient, aged seventeen, had suppuration in the right ear off and on for ten years. It was quiescent until one week before having been seen by the writer, at which time he received a severe blow over the ear, causing a bloody discharge with severe pain for two days. There was slight tenderness over the mastoid antrum; a temperature of 100° F. The usual local treatment failed to make any favorable impression; the familiar symptoms of septic infection soon developed. At the primary operation much carious bone and a large septic thrombus filling the lumen of the sigmoid sinus was removed. Free bleeding followed from the upper portion, but no return flow occurred from the inferior portion. The jugular was thereupon exposed, ligated, and, as no macroscopic evidence of disease was observed, it was not

resected. Two weeks later pus was observed coming from the upper opening of the sinus, which was again opened as far back as the torcular, and an infected thrombus removed therefrom. The subjective symptoms gradually disappeared after this. Although the openings in the antrum and sinus were treated separately, the secondary infection appears to have come from the soiled antrum dressings.

CLEMENS.

225. A boy, eight years of age, suffered from otorrhœa for one and a half years. He was taken ill with fever, headache, and somnolence; polypi in both ears, both mastoid processes swollen. Left ear was operated on. The antral walls were found carious. Intermittent fever, rigors, led to operation on the right side eight days later. As no explanation for the severe condition of the patient could be found on this side, the sinus on the left was exposed. Two thrombi were removed. The temperature dropped. Rigidity of neck, retracted abdomen, facial paralysis, and delirium. Notwithstanding infection of the brain abscess, death took place during convulsions. At autopsy, two cerebral abscesses were found on the right side, one of which communicated with the operative wound.

BRÜHL.

226. This is a continuation of the previous paper on this subject by Schenck and the author. The five additional cases of sinus thrombosis from Leutert's practice are reported; also a case of obliteration of the sinus and one of otitic meningitis without sinus thrombosis.

HAENEL.

227. The patients in both cases suffered from acute otitis. In the first case, the infection at autopsy was found to have extended by way of the transverse sinus, which contained a broken-down clot. The second patient recovered; infection probably occurred through the agency of small blood- and lymph-vessels.

SACHER.

228. LEUTERT replies to the criticism which Körner, in the last edition of his book, makes on his paper on pyæmia. The author does not doubt that the small veins of the mastoid process can be thrombosed, but he does not think that it has been proven that the thrombosis of the osseous veins can of itself produce pyæmia, as an examination of the thrombosed veins of the mastoid process in pyæmia, especially in pyæmia without sinus thrombosis, has not been made. A parietal thrombosis does not produce the same clinical picture as the one described by Körner as following osteophlebitis pyæmia. He thinks that both varieties

of thrombi, parietal and obturating, can produce both forms of general intoxication (two forms of metastases), according to their composition and the stage of their disintegration. As Körner has acknowledged the possibility that his infection may be present in the sinus thrombosis, this disease picture has lost its justification as depending upon a particular anatomical foundation. In conclusion, Leutert states that von Bergmann had recommended, one year before him, the ligation of the jugular vein above the entrance of the facial vein, although he had been the first to insist upon it.

HAENEL.

*d.—OTHER MIDDLE-EAR AFFECTIONS.*

229. Haskin, W. H. Epithelioma of the middle ear. *Annals of Otology, Rhinology, and Laryngology*, Aug., 1902.

230. Jurgens, E. A case of hemorrhage from the middle ear, from the jugular bulb, after cauterization. *M. f. O.*, 1902, No. 4.

229. Patient, female, aged forty-two, with negative family history, has had otorrhœa at intervals for the past thirty years; never received any treatment and rarely had any pain. At the time of examination she complained of intense pain in the left ear, which radiated over the corresponding side of the head, down in the neck, and of something protruding from the ear. The auditory canal was completely filled with a large mucous polyp, which was removed under nitrous oxide, followed by profuse bleeding. The pain was not relieved by the operation, and the growth in a very few days had again developed. Microscopic examination of the polyp revealed simple myxoma with cystic degeneration. As the pain continued in severity a radical operation was made. A large vascular mass was found occupying the antrum, attic, and tympanum, the surrounding osseous tissue being nearly all destroyed. The tumor removed at this operation was pronounced to be "epithelial," but not an epithelioma. The progress of this case was unfavorable; the wound filling with unhealthy granulations from time to time, which, upon being examined four months after the initial operation, was pronounced to be epithelioma without doubt.

CLEMENS.

230. In a soldier twenty-one years of age, after cauterizing the right tympanic cavity with an acid, a hemorrhage took place from the jugular bulb. It was arrested on packing, but recurred twice on changing the dressings within the following eight days. The labyrinthine wall was necrotic and there was profuse purulent

secretion. There was complete deafness in the right ear; the hearing of the left was very much reduced.

PIFFL.

## NERVOUS APPARATUS.

231. **Gronlund, M.** A case of labyrinthine deafness of acute onset. *Hospitstidende*, No. 41, 1902.

232. **Chavanne.** Unilateral hysterical deafness of five years' duration in a patient suffering from Jacksonian epilepsy. *Ann. des mal. de l'or., du lar.* etc., 1902, No. 7.

233. **Bogdanow, Beresowsky, M.** On the pathology and treatment of progressive deafness. *Russki Wratsch*, 1902, Nos. 30, 31, and 32.

234. **Hartmann, F.** On the so-called tumors of the auditory nerve. *Zeitschr. f. Halsk.*, vol. xxiii., No. 11.

231. The patient was a boy fifteen years of age, whose health had always been good. During a voyage he gradually lost hearing for speech. He would perceive that something was said, but did not understand it. Other signs he recognized fairly well. Gait is uncertain and staggering, and if he stands with closed eyes he wavers considerably. Patellar reflex is present; otherwise, physical examination revealed nothing abnormal. Examination with Bezold's continuous-tone series showed tone defects between F and h<sup>2</sup>, sometimes sharply defined and other times varying in extent and position. At the beginning, the deep tones were missing, while hearing for the high tones was good. Examination with speech showed that certain vowels, consonants, and syllables were correctly perceived, while others were not. As to etiology, it was said that he smoked a great deal, drank considerably, but did not remember any injury; he denied syphilis. There is no history of any infectious disease, though before the onset of the deafness he remembered having been kept in bed by severe headache and pain in the stomach. Iodide of potash was given. He was treated with faradisation and warm baths without any effect. After one and a quarter years he returned for treatment and condition was much improved. The author believes that this is a case of sound deafness of labyrinthine origin—perhaps in connection with a very mild cerebro-spinal meningitis. At first the case seemed to be the usual cerebral word-deafness; but the functional examination and the vertigo spoke for labyrinthine trouble.

MOLLER.

232. The patient, twenty-two years of age, became deaf five years ago after an epileptic attack, and has remained so. The functional examination revealed positive Gellé and the presence

of reaction in bone-conduction from this and other hysterical symptoms. The diagnosis of hysterical deafness was made; the hearing was very much improved after treatment with the galvanic current and suggestion.

ZIMMERMANN.

233. Two cases of progressive deafness where the examination with the Bezold's continuous-tone series suggested a very probable affection of the auditory-nerve trunk. Subcutaneous injections of strychnine in the neighborhood of the mastoid process were given, and a distinct improvement in hearing, with a diminution of the tinnitus resulted. The strychnine injections were given in 22 cases of tinnitus; in 17 cases a distinct diminution resulted.

SACHER.

234. This monograph thoroughly reviews all that is known on this subject and endeavors to give a complete clinical picture of the tumors of the auditory nerve. Three personally examined cases are added to the twenty-three found in literature. After a detailed description of each case, the results collected are as follows: Age of the patients varied between thirty and fifty-five years; two-thirds of the cases were male and one-third female. The etiology of the tumors was unknown. Severe traumatism was given as the cause in three cases, and the author is inclined to regard congenitally dispersed germ cells incited to pathological growth through traumatism as the reason for the growth of these tumors. The symptoms are described, with the growth of the tumor in the typical position in the recessus acustico-cerebellaris. General symptoms occur late in the disease and consist in vomiting and headache. Of the focal symptoms, in addition to the vertigo, the early appearing and generally the only symptom is the disturbance of hearing, which leads to complete deafness. The other symptoms consist of cerebellar ataxia, paresis of various ocular muscles, frequently the disturbance of the trochlearis and the disturbance of the fifth nerve with facial paralysis, and in the minor stages, disturbance in the region of the ninth to twelfth nerves. The characteristic picture of this disease is furnished by those cases in which complete nervous deafness is associated with various functional disturbances of a mild grade on the part of the organs in the posterior cerebellar fossa. In regard to treatment, the author believes that operative intervention is decidedly indicated on account of the nature of the disease, the typical localization, and the characteristic easy enucleation of the tumor mass.

PIFFL.

## BOOK NOTICES.

V.—**Précis de Chirurgie cérébrale.** Par A. BROCA, Chirurgien de l'hôpital Tenon; Professor agrégé à la Faculté de médecine de Paris; Membre de la Société de chirurgie. Paris : Masson & Comp., 120, Boul. St. Germain, 1903. Small 8vo of 488 pages, with 58 figures. Cloth binding, fr. 6.

This is an excellent treatise, both theoretical and practical. It is divided into two parts. The first contains general knowledge: the anatomy of the lobes, fissures, and convolutions of the brain, descriptive and topographical; the crano-cerebral topography, the determining points and lines on the outside of the head with regard to the position of the parts in the head.

Then follows a chapter (III.) on cerebral localization, motor, sensitive, and sensory, and the centres of language.

Chapters IV., V., and VI. treat of the clinical indications and the operative management of brain surgery, and of the dangers of the intervention.

The special part begins with the traumatic lesions, to which are devoted ninety-eight pages. Then follow the intracranial complications of purulent middle-ear inflammation (162 pages), meningitis, sinus phlebitis, and abscess (epidural, cerebral, and cerebellar). These extensions of the purulent process of the tympanum and mastoid apophysis are described with great detail, supported by numerous operative and post-mortem verifications or corrections of the diagnosis; for instance, the apparent presence of meningitis, which was cured by extensive operations where neither abscess nor meningitis was found, which is explained by the œdema surrounding more or less extensively the purulent foci in the middle ear and mastoid, cases of which have been noted by every aurist of sufficient practice.

Sinus phlebitis and abscess are described exhaustively in their pathology, symptoms, and surgical interventions. The exposi-

tions are so clear, so well digested, and going over so much ground that the reader is fascinated by the variety and usefulness of the subjects.

The remainder of the *Précis* is devoted to intracranial tumors (very good statistics, symptomatology, and localization) and diverse brain lesions—hemorrhage and softening, meningitis and abscess from different causes, metastatic, etc., general paralysis, hydrocephalus, microcephalus, and various functional troubles—epilepsy, psychoses, cephalgic, and encephalocele. All these affections are carefully described. The author dwells on the differential diagnosis and the surgical and palliative treatment of these frequent and often occult diseases, pointing out which of them and in what way they are amenable to treatment.

The neat, interesting, and instructive book should, and surely will, be read extensively.

H. KNAPP.

**VI.—A Text-Book on the Diseases of the Ear.** By Prof. ADAM POLITZER, M.D. Fourth edition, revised and enlarged, with 346 illustrations. Translated by MILTON J. BALLIN, Ph.B., M.D., and CLARENCE L. HELLER, M.D. Lea Bros. & Co., Philadelphia and New York, 1903.

This is the translation of the fourth edition of the classical text-book of otology by the famous professor of the Vienna University, which, by general consent, is considered as the standard treatise on the science and practice of aural surgery, a rank which it has maintained for so many years. The translation is by two young and talented aurists, one of New York, both Americans, who, as Politzer's assistants, made the translation in Vienna under the supervision of the author, while the German edition went through the press. The translation is well done, and the typography does credit to the well-known American publishers. We reviewed the appearance of the fourth German edition several months ago, and can only add that we are assured that the English rendition will meet with the favor which it has enjoyed before, and so fully deserves.

H. KNAPP.